

# (12) United States Patent

Thurner

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#### DEVICE FOR REPAIRING A TIRE FAULT (54)

(75)	Inventor:	Helmut Thurner, Bad
		Griesbach-Reuthen (DE)

Assignee: Alusuisse Bayrisches Druckguss-Werk GmbH Co. KG, Markt Schwaben (DE)

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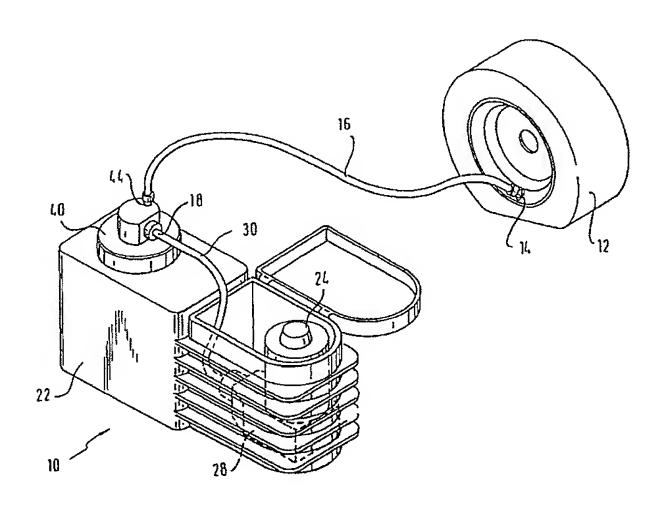
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Primary Examiner—Timothy L. Maust (74) Attorney, Agent, or Firm-Weingarten, Schurgin, Gagnebin & Hayes LLP

#### (57)**ABSTRACT**

A device for repairing a tire fault by injecting repair liquid into the faulty tire, said liquid being present in a compressible liquid storage volume (100). Said volume (100) is sealed in such a way that it is watertight at at least one first sealing point (60) to be opened and is located in a pressurized container (56). Said pressurized container is subjected to the pressure of a pressurized gas from a pressurized gas source (28) in a compression chamber which becomes larger as it is affected by the pressurized gas. When the first sealing point (60) is opened, the volume (100) delivers repair liquid to the tire (12) through the opened first sealing point (60) be extracted from the volume. The pressure then drops in a chamber (58) arranged above the pressurized container (56), the pressure difference between the pressurized gas delivery channel (46, 54) and this chamber (58) increasing and causing at least one second sealing point (62) to open, said second sealing point being between the delivery channel (46, 54) and the chamber (58), thereby clearing the channel leading through the flexible delivery tube (16), from the pressurized gas source (28) to the tire (12).

## 18 Claims, 4 Drawing Sheets





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### **SEALING SYSTEM**

Inventor: Arnold Eckhardt, Ranstadt (DE)

Correspondence Address: The Goodyear Tire & Rubber Company Patent & Trademark Department - D/823 1144 East Market Street Akron, OH 44316-0001 (US)

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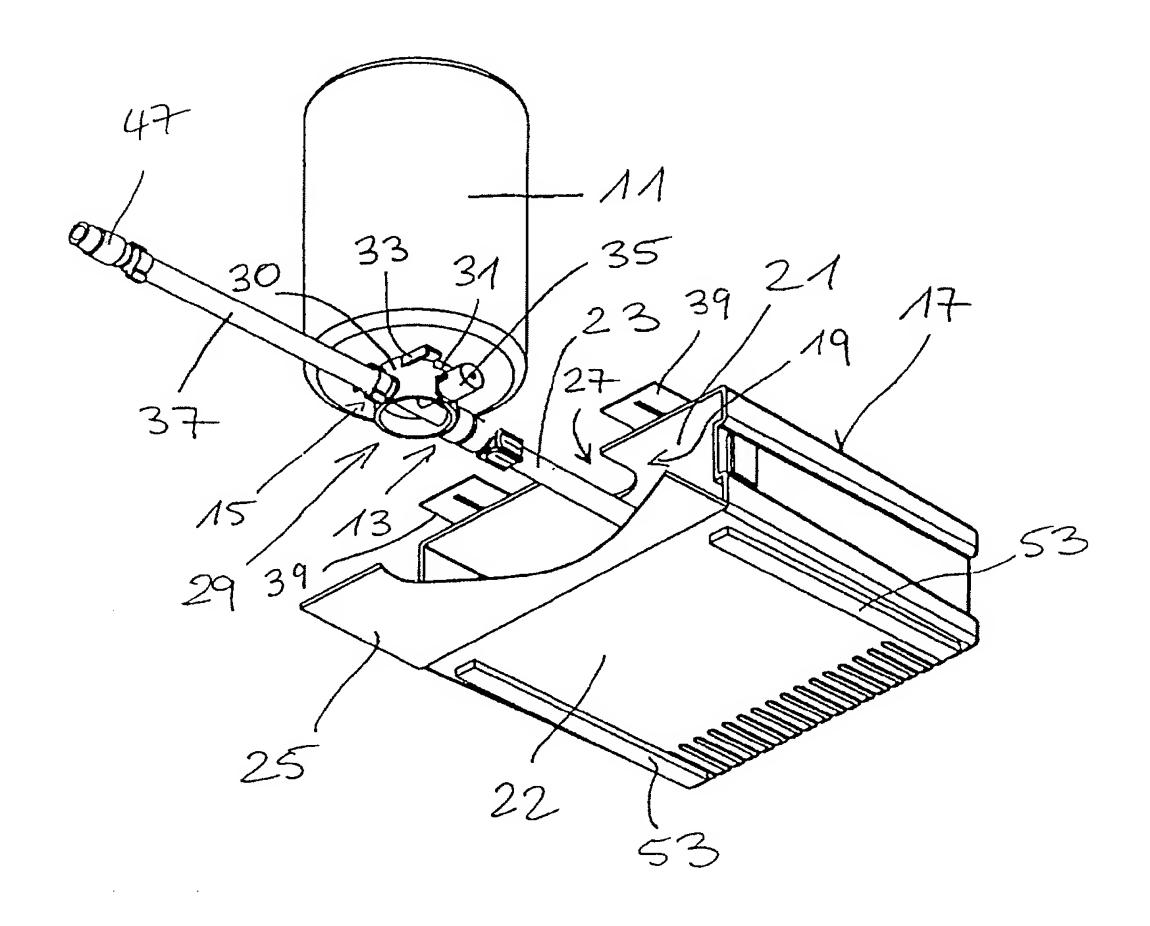
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#### (57) **ABSTRACT**

A system for the sealing of inflatable articles, in particular tires, has at least one container containing a sealant. This container has a gas inlet and an outlet which can be coupled to an article to be sealed. A source of gas pressure, in particular an electrically drivable compressor, is connectable to the gas inlet of the container and at least partly accommodated in a housing. The housing of the gas pressure source has at least one coupling section at which the container can be coupled mechanically to the housing, in particular coupled in form-matched and/or force transmitting manner, to establish a state of use in such a way that the housing of the gas pressure source standing on the ground serves as a pedestal for the container, which is oriented in accordance with its intended purpose.



## **PCT**

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- (71) Anmelder (für alle Bestimmungsstaaten ausser US): DUNLOP GMBH [DE/DE]; Dunlopstrasse 2, D-63450 Hanau (DE).
- (72) Erfinder; und
- (75) Erfinder/Anmelder (nur für US): ECKHARDT, Arnold [DE/DE]; Heinrichspforte 4c, D-63691 Randstadt (DE).
- (74) Anwalt: MANITZ, FINSTERWALD & PARTNER GBR; Postfach 22 16 11, D-80506 München (DE).
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Mit internationalem Recherchenbericht.

(54) Title: SEALING DEVICE

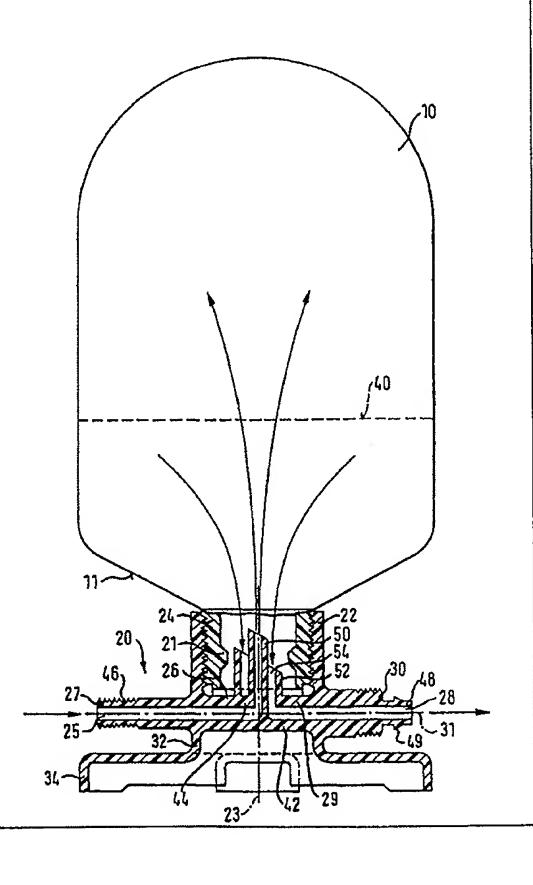
(54) Bezeichnung: ABDICHTVORRICHTUNG

#### (57) Abstract

The invention relates to a device for sealing inflatable objects, especially tyres, consisting of a container (10) that contains sealing agents and has a gas inlet (25) which can be connected to a gas pressure source and an outlet (28) that can be coupled to an object that is to be sealed. The gas inlet and the outlet are connected to each other via the interior of the container. The gas inlet and the outlet are embodied in a discharge unit (20) that is detachably connected to the container (10) and is preferably screwed.

### (57) Zusammenfassung

Die Erfindung betrifft eine Vorrichtung zum Abdichten aufblasbarer Gegenstände, insbesondere Reifen, mit einem ein Abdichtmittel enthaltenden Behälter (10), der einen an eine Gasdruckquelle anschliessbaren Gaseinlass (25) und einen mit einem abzudichtenden Gegenstand koppelbaren Auslass (28) aufweist, wobei der Gaseinlass und der Auslass über den Behälterinnenraum miteinander in Verbindung stehen, und wobei der Gaseinlass und der Auslass in einer lösbar mit dem Behälter (10) verbundenen, bevorzugt verschraubten Entnahmeeinheit (20) ausgebildet sind.



## LEDIGLICH ZUR INFORMATION

Codes zur Identifizierung von PCT-Vertragsstaaten auf den Kopfbögen der Schriften, die internationale Anmeldungen gemäss dem PCT veröffentlichen.

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Abdichtvorrichtung

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Die Erfindung betrifft eine Vorrichtung zum Abdichten aufblasbarer Gegenstände, insbesondere Reifen, mit einem ein Abdichtmittel enthaltenden Behälter, der einen an eine Gasdruckquelle anschließbaren Gaseinlaß und einen mit einem abzudichtenden Gegenstand koppelbaren Auslaß aufweist, wobei der Gaseinlaß und der Auslaß über den Behälterinnenraum miteinander in Verbindung stehen.

Derartige Vorrichtungen sind bekannt und dienen dazu, ein Leck in dem aufblasbaren Gegenstand, beispielsweise in einem durchstochenen oder während der Fahrt beschädigten Reifen, dadurch abzudichten, daß ein spezielles Abdichtmittel über das Reifenventil in den Reifen eingebracht und der Reifen anschließend zumindest auf einen Druck, bei dem er gefahren werden kann, aufgepumpt wird.

20 Es ist das der Erfindung zugrundeliegende Problem (Aufgabe), eine Vorrichtung der eingangs genannten Art derart weiterzubilden, daß sie möglichst preiswert und vielseitig einsetzbar ist.

Die Lösung dieser Aufgabe erfolgt durch die Merkmale des Anspruchs 1 und insbesondere dadurch, daß der Gaseinlaß und der Auslaß in einer lösbar mit dem Behälter verbundenen, bevorzugt verschraubten Entnahmeeinheit ausgebildet sind. Das erfindungsgemäße Vorsehen einer separaten Entnahmeeinheit ermöglicht es, den Behälter auszuwechseln, wenn das Abdichtmittel verbraucht oder verfallen ist, ohne daß die gesamte Abdichtvorrichtung erneuert werden muß. Des weiteren kann die wiederverwendbare Entnahmeeinheit mit Behältern unterschiedlicher Größe verwendet und die erfindungsgemäße Abdichtvorrichtung somit optimal an den jeweiligen aufblasbaren Gegenstand angepaßt werden.

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Gemäß einem bevorzugten Ausführungsbeispiel der Erfindung weist die Entnahmeeinheit für den insbesondere flaschenförmigen Behälter, bevorzugt zur Aufnahme eines flaschenhalsartigen Anschlußabschnitts des Behälters, wenigstens einen im wesentlichen zylindrischen Anschlußstutzen auf.

Hierdurch können der Behälter und die Entnahmeeinheit in besonders einfacher Weise miteinander verbunden werden. Der Anschlußstutzen kann mit einem Innengewinde versehen werden, so daß der Behälter, insbesondere dessen mit einem entsprechenden Außengewinde versehener Anschlußabschnitt, einfach in den Anschlußstutzen geschraubt zu werden den braucht.

Gemäß einer weiteren bevorzugten Ausführungsform der Erfindung verlaufen eine Einlaßleitung und eine Auslaßleitung jeweils im Bereich ihres mit dem Behälterinnenraum kommunizierenden freien Endes innerhalb eines Anschlußstutzens der Entnahmeeinheit, wobei sich die freien Enden der Einlaßleitung und der Auslaßleitung jeweils nicht über das freie Ende des Anschlußstutzens hinaus erstrecken.

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Hierdurch kann die erfindungsgemäße Abdichtvorrichtung in zwei verschiedenen Betriebsstellungen verwendet werden. Bei auf dem Boden stehender Entnahmeeinheit und auf dem Kopf gestelltem, mit einer Öffnung nach unten an den Anschlußstutzen der Entnahmeeinheit gekoppeltem Behälter strömt das Gas über die Einlaßleitung in den Behälter hinein und - bei nicht vollständig gefülltem Behälter - durch das Abdichtmittel hindurch nach oben zum von der Entnahmeeinheit abgewandten Behälterboden. Der freie Raum oberhalb des Abdichtmittelspiegels wird dadurch unter Druck gesetzt, so daß das Abdichtmittel durch die Auslaßleitung hindurch in den abzudichtenden Gegenstand gedrückt wird.

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Nachdem ein Teil des Abdichtmittels in den abzudichtenden Gegenstand eingebracht worden ist, kann die Abdichtvorrichtung umgedreht und mit der Entnahmeeinheit nach oben angeordnet werden. Das im Behälter verbliebene Abdichtmittel sammelt sich im Bereich des Behälterbodens, so daß die freien Enden der Einlaßleitung und der Auslaßleitung nunmehr freiliegen und nicht mehr in das Abdichtmittel eingetaucht sind. Das über die Einlaßleitung in den Behälter strömende Gas füllt nunmehr den freien Raum zwischen der Öffnung des Behälters und dem Abdichtmittelspiegel und kann somit direkt über die Auslaßleitung in den abzudichtenden Gegenstand strömen, wodurch dieser aufgepumpt wird.

Von besonderem Vorteil ist diese Vorgehensweise in Fällen, in denen mehrere Reifen eines Fahrzeugs oder mehrere Kammern einer Luftmatratze beschädigt sind. Nach dem Einbringen eines Teils des Abdichtmittels in z. B. den ersten abzudichtenden Reifen kann - wie vorstehend erläutert - durch Umdrehen der Abdichtvorrichtung der abgedichtete Reifen aufgepumpt werden, bevor die Reparatur mit dem nächsten beschädigten

Reifen fortgesetzt wird. Das Abdichten und Aufpumpen mehrerer beschädigter Gegenstände hintereinander kann auf diese Weise besonders effizient durchgeführt werden.

Der Umstand, daß während des Einbringens des Abdichtmittels in den 5 abzudichtenden Gegenstand das in den Behälter eintretende Gas durch das Abdichtmittel hindurchströmt, sorgt des weiteren in vorteilhafter Weise für eine Durchmischung des Abdichtmittels. Ein Schütteln der Abdichtvorrichtung oder des Behälters vor der Benutzung ist daher nicht erfor-

derlich. 10

> Wenn gemäß einem weiteren bevorzugten Ausführungsbeispiel der Erfindung der Behälter und die Entnahmeeinheit aus einem bevorzugt recyclingfähigen Kunststoff hergestellt sind, kann die Abdichtvorrichtung aufgrund ihres dann vergleichsweise geringen Eigengewichts leicht transportiert und insbesondere auch von körperlich schwachen Personen mühelos benutzt werden. Dies ist besonders vorteilhaft im Hinblick auf die vorstehend erläuterte Reparatur mehrerer beschädigter Gegenstände hintereinander, bei der die Abdichtvorrichtung mehrmals gedreht wird.

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Weitere bevorzugte Ausführungsformen der Erfindung sind in den Unteransprüchen, der Beschreibung sowie der Zeichnung angegeben.

Die Erfindung wird im folgenden beispielhaft unter Bezugnahme auf die Zeichnung beschrieben. Es zeigen: 25

eine geschnittene Seitenansicht einer Abdichtvorrich-Fig. 1 tung gemäß einer Ausführungsform der Erfindung, und

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Fig. 2 die erfindungsgemäße Abdichtvorrichtung von Figur 1 in einer Anwendungsumgebung.

In der Ausführungsform der Erfindung gemäß Fig. 1 umfaßt die Abdichtvorrichtung einen flaschenartig geformten, druckfesten Behälter 10 aus recyclingfähigem Kunststoff, der einen nach Art eines Flaschenhalses ausgebildeten, etwa zylindrischen Anschlußabschnitt 24 aufweist, der im folgenden als Hals bezeichnet wird.

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Der Hals 24 ist an seiner Außenseite mit einem Gewinde versehen, welches es gestattet, den Behälter 10 in einen ein passendes Innengewinde aufweisenden Anschlußstutzen 22 einer ebenfalls aus recyclingfähigem Kunststoff hergestellten, einstückig ausgebildeten druckfesten Entnahmeeinheit 20 derart einzuschrauben, daß der Behälterinnenraum gegenüber der Umgebung abgedichtet ist.

Der Hals 24 des Behälters 10 und der Anschlußstutzen 22 der Entnahmeeinheit 20 weisen etwa die gleiche Länge auf. An seiner Innenseite ist der Hals 24 mit einer Einschnürung 21 in Form eines radial nach innen vorstehenden, ringförmigen Wulstes versehen.

Der Behälter 10 enthält ein flüssiges Abdichtmittel, wie es beispielsweise in der deutschen Patentanmeldung 196 52 546 beschrieben ist, wobei in dem Zustand gemäß Fig. 1 der Behälter 10 zu weniger als die Hälfte mit dem Abdichtmittel gefüllt ist, wie es die den Abdichtmittelspiegel 40 andeutende gestrichelte Linie in Fig. 1 zeigt. Der Behälter 10 kann z. B. zur Aufnahme eines Volumens von 700 - 800 ml ausgelegt sein. Im Original-

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zustand vor seiner ersten Benutzung ist der Behälter 10 bevorzugt vollständig ohne Einschluß von Luft mit dem Abdichtmittel gefüllt, so daß keine störende Hautbildung auftreten kann. Der in Fig. 1 angedeutete Abdichtmittelspiegel 40 repräsentiert folglich einen Zwischenzustand nach Inbetriebnahme, d. h. einen bereits teilweise entleerten Behälter 10.

Der Anschlußstutzen 22 bildet ein freies Ende eines zylindrischen Anschlußabschnitts 32 der Entnahmeeinheit 20, welcher sich an seinem von dem Behälter 10 abgewandten Ende in radialer Richtung zu einem Fußabschnitt 34 erweitert. Die maximale radiale Abmessung des Fußabschnitts 34 beträgt mehr als das Zweifache des Durchmessers des Anschlußabschnitts 32, wodurch ein sicherer Stand der Abdichtvorrichtung gewährleistet ist.

Im Anschlußabschnitt 32 der Entnahmeeinheit 20 sind zwei mit Abstand voneinander angeordnete Bodenplatten 42, 44 angeordnet, die den Fußabschnitt 34 vom Anschlußstutzen 22 trennen. An der oberen Bodenplatte 44 liegt der Behälter 10 im eingeschraubten Zustand gemäß Fig. 1 mit dem eine Öffnung des Behälters 10 begrenzenden Rand des Anschlußabschnitts 24 an.

Zwischen den beiden Bodenplatten 42, 44 erstrecken sich in radialer Richtung Innenabschnitte 26, 29 einer Einlaßleitung 25 bzw. einer Auslaßleitung 28, deren untere und obere Begrenzungswand jeweils durch die untere bzw. obere Bodenplatte 42 bzw. 44 gebildet wird.

Außerhalb des Anschlußabschnitts 32 der Entnahmeeinheit 20 gehen die Innenabschnitte 26, 29 jeweils in einen Außenabschnitt 27, 30 über. Die

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Innenabschnitte 26, 29 und die Außenabschnitte 27, 30 liegen mit ihren Mittelachsen auf einer gemeinsamen Längsachse 31.

Der Außenabschnitt 27 der Einlaßleitung 25 ist als Gaseinlaß ausgebildet und weist im Bereich seines freien Endes ein bevorzugt als VG8-Ventilgewinde ausgebildetes Gewinde 46 zum Anschluß an eine in Fig. 1 nicht gezeigte Gasdruckquelle auf.

Der Außenabschnitt 30 der Auslaßleitung 28 ist mit einem Ansatz 48 reduzierten Durchmessers versehen, an dessen Außenseite hakenartige Kopplungselemente 49 angeformt sind und der zur Verbindung mit einer nachfolgend anhand von Fig. 2 näher erläuterten Fülleitung dient, über welche die Abdichtvorrichtung mit einem abzudichtenden Gegenstand verbunden werden kann.

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Während die freien inneren Querschnittsflächen der Einlaßleitung 25 und der Auslaßleitung 28 gleich groß sind, weist der Außenabschnitt 30 der Auslaßleitung 28 eine größere Wandstärke auf als der Außenabschnitt 27 der Einlaßleitung 25. Abweichend von der dargestellten Ausführungsform können die freien inneren Querschnittsflächen der Einlaßleitung 25 und der Auslaßleitung 28 auch von unterschiedlicher Größe sein.

Der Innenabschnitt 26 der Einlaßleitung 25 geht in einen Einströmkanal 50 über, dessen Längsachse mit der Längsachse 23 des Anschlußstutzens 22 zusammenfällt und dessen freie innere Querschnittsfläche kleiner als diejenige des Innenabschnitts 26 ist. Der Einströmkanal 50 ragt in den Anschlußstutzen 22 der Entnahmeeinheit 20 und somit in den Hals 24 des eingeschraubten Behälters 10 hinein, wobei sich der Einströmkanal

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50 jedoch nicht über das freie Ende des Anschlußstutzens 22 hinaus erstreckt.

Der Einströmkanal 50 ist bereichsweise im Inneren eines Entnahmekanals 52 der Auslaßleitung 28 angeordnet, der den Einströmkanal 50 konzentrisch umgibt, so daß der Einströmkanal 50 und der Entnahmekanal 52 ein Koaxial-Leitungssystem bilden und ein Ringraum 54 entsteht, an den der Innenabschnitt 29 der Auslaßleitung 28 angeschlossen ist. Das aus dem Entnahmekanal 52 ragende freie Ende des Einströmkanals 50 und das freie Ende des Entnahmekanals 52 ist jeweils abgeschrägt.

Der Hals 24 des Behälters 10 kann derart ausgebildet sein, daß in den Hals 24 ein als Venturidüse ausgebildetes Adapterelement eingebracht, insbesondere eingeschraubt werden kann.

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Gemäß Fig. 2 ist an die Entnahmeeinheit 20 über den Ansatz 48 der Auslaßleitung 28 eine als Schlauch ausgebildete Fülleitung 36 angeschlossen, die an ihrem freien Ende mit einer zu einem VG8-Ventilgewinde passenden Überwurfmutter 56 versehen ist, um die Fülleitung 36 an einen abzudichtenden Reifen 18 anschließen zu können. Die Fülleitung 36 kann entweder lösbar oder fest mit der Entnahmeeinheit 20 verbunden sein.

Links neben der erfindungsgemäßen Abdichtvorrichtung ist in Fig. 2 schematisch eine Gasdruckquelle 12 mit einer Druckanzeige und mit Bedienelementen zur Druckregelung dargestellt, die eine Anschlußleitung aufweist, an deren freiem Ende eine der Überwurfmutter 56 entsprechende Überwurfmutter 58 zum Anschluß der Gasdruckquelle 12 an die Einlaßleitung 25 der Entnahmeeinheit 20 angeordnet ist.

Die Gasdruckquelle 12 ist bevorzugt zur Bereitstellung von Druckluft ausgebildet und kann beispielsweise als Kleinkompressor, KFZ-Zentralkompressor, stationäre Druckluftversorgungsanlage oder tragbarer Druckspeicherbehälter, wie sie beispielsweise an Tankstellen zur Verfügung stehen, oder als Hand- oder Fußluftpumpe ausgebildet sein. Der maximal von der Gasdruckquelle 12 zu erbringende Druck braucht nicht größer zu sein als der für zumindest einen Notbetrieb des Reifens 18 erforderliche Druck. Zum Entleeren des Behälters 10 braucht die Gasdruckquelle 12 keinen bestimmten Mindestdruck erbringen zu können.

Aus Fig. 2 ist zu erkennen, daß der Fußabschnitt 34 der Entnahmeeinheit 20 vier sich sternförmig in radialer Richtung vom Anschlußabschnitt 32 weg erstreckende Füße 35 umfaßt.

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Die Funktionsweise der erfindungsgemäßen Abdichtvorrichtung wird im folgenden am Beispiel eines abzudichtenden Reifens 18 beschrieben.

Zunächst wird die an die Auslaßleitung 28 der Entnahmeeinheit 20 angeschlossene Fülleitung 36 an das Ventil 38 des Reifens 18 angeschlossen, indem die Überwurfmutter 56 auf das Ventilgewinde geschraubt wird. Die Gasdruckquelle 12 kann dabei bereits an die Entnahmeeinheit 20 angeschlossen oder noch von dieser getrennt sein.

Eventuell noch vorhandener Restdruck im Reifen 18 kann entweder über ein nicht dargestelltes, in der Fülleitung 36, der Entnahmeeinheit 20 oder dem Behälter 10 angeordnetes Ventil oder durch die gesamte Abdichtvorrichtung hindurch über die Einlaßleitung 25 entweichen, sofern die Gas-

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druckquelle 12 noch nicht angeschlossen ist. Es ist auch möglich, die Fülleitung 36 zunächst an den Reifen 18 und erst dann an die Entnahmeeinheit 20 anzuschließen, wenn der Restdruck über die Fülleitung 36 aus dem Reifen 18 entwichen ist. Wenn noch kein Behälter 10 in die Entnahmeeinheit 20 geschraubt ist, ist es auch möglich, den Restdruck im Reifen 18 direkt über den Anschlußstutzen 22 entweichen zu lassen.

In jedem Fall findet folglich eine Zwangsentlüftung des Reifens 18 statt, so daß kein Rückschlagventil erforderlich ist und insbesondere bei der Verwendung eines Kleinkompressors als Gasdruckquelle 12 ein zu hoher Anlaufstrom vermieden wird. Zum Entleeren des Behälters 10 muß die Gasdruckquelle 12 somit nicht gegen einen vom Reifen 18 aufgebrachten Gegendruck arbeiten.

Anschließend wird gegebenenfalls die Gasdruckquelle 12 an die Einlaßleitung 25 der Entnahmeeinheit 20 angeschlossen.

Falls die Entnahmeeinheit 20 nicht bereits mit einem mit Abdichtmittel gefüllten Behälter 10 versehen ist, wird vor oder nach dem Anschluß der Gasdruckquelle 12 an die Entnahmeeinheit 20 ein neuer Behälter 10 mit seinem Hals 24 in den Anschlußstutzen 22 der Entnahmeeinheit 20 geschraubt. Bevorzugt ist die Öffnung des Behälters 10 beispielsweise mittels einer Folie versiegelt, die beim Einschrauben in den Anschlußstutzen 22 durch die abgeschrägten Enden des Einströmkanals 50 und des Entnahmekanals 52 aufgebrochen wird.

Es ist auch möglich, einen als Verlängerung des Anschlußstutzens 22 oder als separates Bauteil ausgebildeten Sicherungsring vorzusehen, der

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beim Einschrauben des Behälters 10 nach Art von Sicherungsringen, wie sie z. B. an Deckeln von Getränkeflaschen vorhanden sind, zwischen dem Behälter 10 und der Entnahmeeinheit 20 angeordnet ist. Im Fall eines als Verlängerung des Anschlußstutzens 22 ausgebildeten Sicherungsringes kann dieser über Sollknickstellen insbesondere in Form von Filmscharnieren mit dem Anschlußstutzen 22 verbunden sein und eine geringere Wandstärke als der Anschlußstutzen 22 aufweisen.

Ein solcher Sicherungsring ist derart ausgebildet, daß er beim Einschrauben des Behälters 10 erst durch Aufbringen einer bestimmten Mindestkraft durch die als Keil wirkende Schrägschulter 11 des Behälters 10 auseinandergedrückt wird. Der Sicherungsring kann als Berstring ausgeführt sein, der durch vollständiges Einschrauben des Behälters 10 zerstört wird.

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Das Vorsehen eines derartigen Sicherungsringes ermöglicht es, zur Vereinfachung der Handhabung der Abdichtvorrichtung den Behälter 10 im Rahmen einer Vormontage zunächst nur lose gegen den Sicherungsring zu schrauben, wobei dieser sich im Vormontage-Zustand an der Schrägschulter 11 des Behälters 10 abstützt. Eine einzige Gewindedrehung reicht dabei aus, um den Behälter 10 verliersicher an der Entnahmeeinheit 20 zu halten.

In diesem Vormontage-Zustand ist die die Öffnung des Behälters 10 versiegelnde Folie noch unversehrt, so daß kein Abdichtmittel auslaufen kann. Nur durch Überwinden des durch den Sicherungsring dem Behälter 10 entgegengebrachten Widerstandes kann die Folie durch die abge-

schrägten Enden des Einströmkanals 50 und des Entnahmekanals 52 aufgebrochen werden.

- Um zu verhindern, daß vor Inbetriebnahme der Anordnung Abdichtmittel über die Einlaßleitung 25 aus der Entnahmeeinheit 20 herausläuft, kann beispielsweise in der Einlaßleitung 25 eine Absperrvorrichtung vorgesehen sein oder der Behälter 10 im aufrechtstehenden Zustand mit der Entnahmeeinheit 20 verschraubt werden.
- Zum Einbringen von Abdichtmittel in den Reifen 18 wird die erfindungsgemäße Abdichtvorrichtung mit der Entnahmeeinheit 20 auf den Boden gestellt, wie es in Fig. 2 gezeigt ist, so daß der Behälter 10 mit seiner Öffnung nach unten angeordnet ist.
- Nach Aktivierung der Gasdruckquelle 12 strömt das Gas gemäß dem in Fig. 1 durch Pfeile angedeuteten Verlauf über die Einlaßleitung 25 und deren von Abdichtmittel umgebenem Einströmkanal 50 in den Behälter 10 und durch das Abdichtmittel hindurch in den Bereich oberhalb des Abdichtmittelspiegels 40. Das in diesem Bereich unter sich erhöhendem

  Druck stehende Gas drückt das Abdichtmittel über den vom Einströmkanal 50 und vom Entnahmekanal 52 gebildeten Ringraum 54 der Auslaßleitung 28 durch die Fülleitung 36 in den Reifen 18. Die im Hals 24 bei der Herstellung bevorzugt in einem Arbeitsgang mit dem Behälter 10 ausgebildete Einschnürung 21 ist derart ausgestaltet, daß sie sich dabei vorteilhaft auf den Verlauf der Strömung des Abdichtmittels auswirkt.

Auch im Fall eines vollständig und ohne Lufteinschluß gefüllten Behälters 10 wird das Abdichtmittel aufgrund der durch das in den Behälter 10

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strömende Gas verursachten Druckerhöhung über den Entnahmekanal 52 aus dem Behälter 10 getrieben.

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Wenn die zur Behebung des Reifenlecks erforderliche Abdichtmittelmenge in den Reifen 18 eingebracht worden und noch eine Restmenge an Abdichtmittel im Behälter 10 vorhanden ist, wird die erfindungsgemäße Abdichtvorrichtung um 180° gedreht und auf den Kopf gestellt. Hierzu kann abweichend von der in den Fig. 1 und 2 dargestellten Ausführungsform die von der Entnahmeeinheit 20 abgewandte Bodenseite des Behälters 10 als Standfläche ausgebildet sein.

Das Abdichtmittel sammelt sich nunmehr an der von der Entnahmeeinheit 20 abgewandten Seite des Behälters 10 im Bereich des Behälterbodens, so daß das weiterhin durch die Einlaßleitung 25 in den Behälter 10 strömende Gas direkt in die Auslaßleitung 28 und in den Reifen 18 strömt. Auf diese Weise kann der Reifen 18 unmittelbar im Anschluß an das Einbringen des Abdichtmittels auf seinen Betriebsdruck oder zumindest auf einen Druck aufgepumpt werden, bei dem das betreffende Fahrzeug eine gewisse Strecke gefahren werden kann.

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Indem die Abdichtvorrichtung erneut gedreht und wieder mit der Entnahmeeinheit 20 nach unten auf den Boden gestellt wird, können mit dem
im Behälter 10 verbliebenen Abdichtmittel gegebenenfalls weitere beschädigte Reifen entsprechend der vorstehend beschriebenen Vorgehensweise
abgedichtet werden.

Um während oder nach Abschluß der Benutzung einen im Behälter 10 herrschenden Restdruck abbauen zu können, kann in der Behälterwand

ein in Fig. 1 und 2 nicht dargestelltes Ventil vorgesehen sein. Dieses kann gemäß einer besonders einfachen Ausführung als eine Entlastungsbohrung mit einem Durchmesser von z. B. 0,5 mm ausgeführt sein, die in der unteren Bodenplatte 42 ausgebildet ist und in die Einlaßleitung 25 mün-

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Zur Anpassung an unterschiedliche Einsatzbedingungen können verschiedene Adapterelemente in Verbindung mit der Einlaßleitung 25, der Auslaßleitung 28 und/oder der Fülleitung 36 sowie Fülleitungen 36 unterschiedlicher Länge verwendet werden.

Des weiteren kann die Entnahmeeinheit 20 in vorteilhafter Weise mit unterschiedlichen Behältern 10 kombiniert werden, die sich hinsichtlich ihrer Form, ihrer Größe und/oder des enthaltenen Abdichtmittels unterscheiden können.

Insbesondere im Hinblick auf die von vorbeifahrenden Fahrzeugen ausgehende Gefahr für den Benutzer bei Reifenpannen besteht ein Vorteil der erfindungsgemäßen Abdichtvorrichtung darin, daß sich der Benutzer lediglich zum Anschließen der Fülleitung 36 an das Ventil 38 in unmittelbarer Nähe des Reifens 18 aufhalten muß. Die Bedienung der Gasdruckquelle 12, das Einschrauben des Behälters 10, das Umdrehen der Abdichtvorrichtung sowie die Überwachung des Abdicht- und Aufpumpvorgangs über die Anzeige der Gasdruckquelle 12 kann dann an einer vom abzudichtenden Reifen entfernten, sicheren Stelle erfolgen.

### **Patentansprüche**

- Vorrichtung zum Abdichten aufblasbarer Gegenstände, insbesondere Reifen, mit einem ein Abdichtmittel enthaltenden Behälter (10), der einen an eine Gasdruckquelle (12) anschließbaren Gaseinlaß und einen mit einem abzudichtenden Gegenstand (18) koppelbaren Auslaß aufweist, wobei der Gaseinlaß und der Auslaß über den Behälterinnenraum miteinander in Verbindung stehen,
   dadurch gekennzeichnet in et, daß der Gaseinlaß und der Auslaß in einer lösbar mit dem Behälter (10) verbundenen, bevorzugt verschraubten Entnahmeeinheit (20) ausgebildet sind.
- Vorrichtung nach zumindest einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Behälter (10) und/oder die bevorzugt einstückige Entnahmeeinheit (20) aus einem vorzugsweise recyclingfähigen Kunststoff hergestellt sind/ist.

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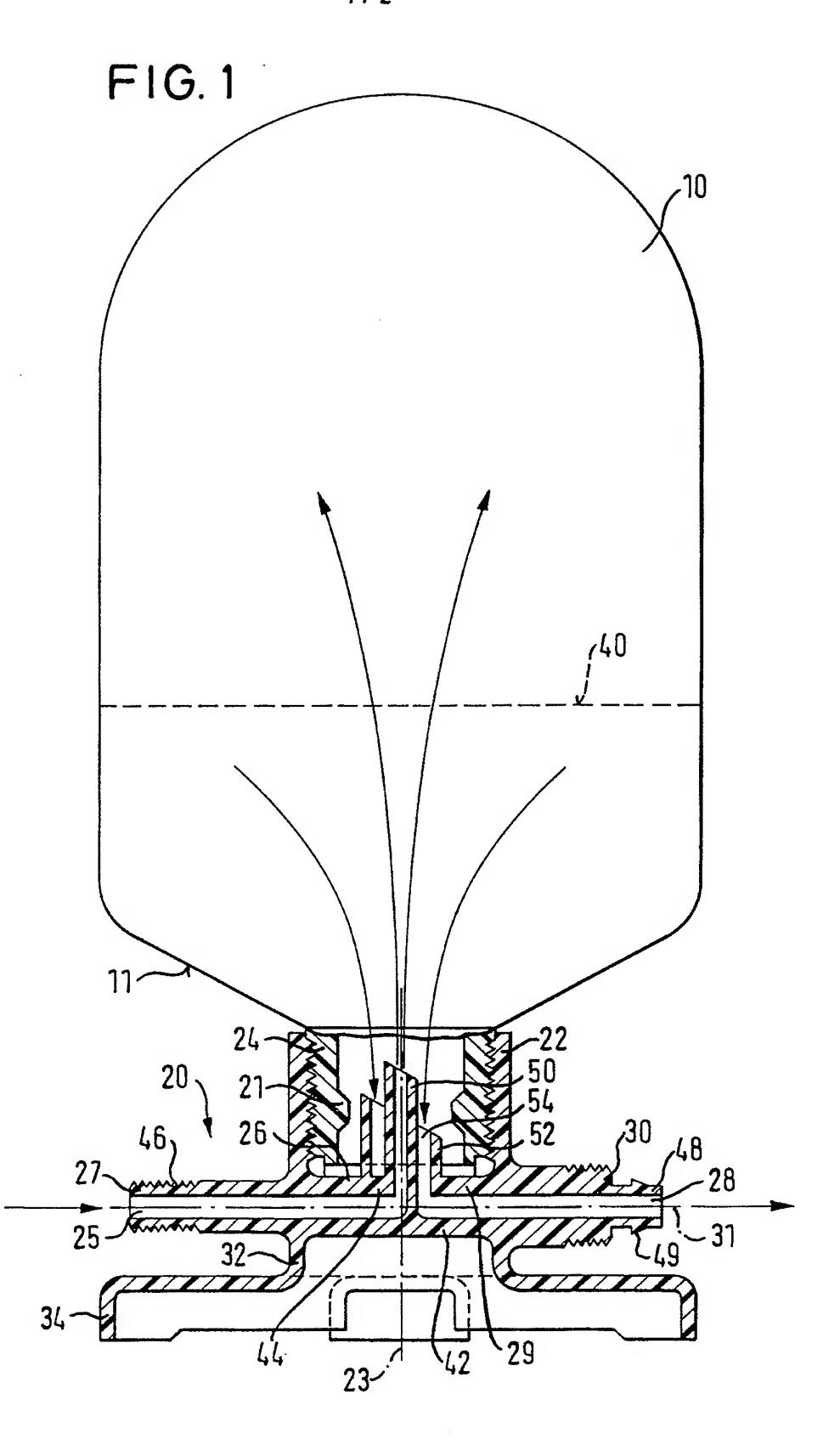
3. Vorrichtung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Entnahmeeinheit (20) für den insbesondere flaschenförmigen Behälter (10), bevorzugt zur Aufnahme eines flaschenhalsartigen Anschlußabschnitts (24) des Behälters (10), wenigstens einen im wesentlichen zylindrischen Anschlußstutzen (22) aufweist.

- Vorrichtung nach zumindest einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, on zeichnet, daß die Entnahmeeinheit (20) eine Einlaßleitung (25) und eine Auslaßleitung (28) aufweist, die jeweils einen in den Behälter (10) hineinragenden Innenabschnitt (26, 29) und einen Außenabschnitt (27, 30) umfassen, an denen der Gaseinlaß bzw. der Auslaß ausgebildet ist, wobei bevorzugt die Innenabschnitte (26, 29) etwa parallel und die Außenabschnitte (27, 30) etwa senkrecht zu einer Längsachse (23) eines Anschlußstutzens (22) der Entnahmeeinheit (20) verlaufen.
- Vorrichtung nach zumindest einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß eine Einlaßleitung (25) und eine Auslaßleitung (28) jeweils im Bereich ihres mit dem Behälterinnenraum kommunizierenden freien Endes innerhalb eines Anschlußstutzens (22) der Entnahmeeinheit (20) verlaufen.
- 6. Vorrichtung nach zumindest einem der vorhergehenden Ansprüche,
  20 dadurch gekennzeichnet,
  daß sich freie Enden einer Einlaßleitung (25) und einer Auslaßleitung (28) jeweils nicht über das freie Ende eines Anschlußstutzens
  (22) der Entnahmeeinheit (20) hinaus erstrecken.

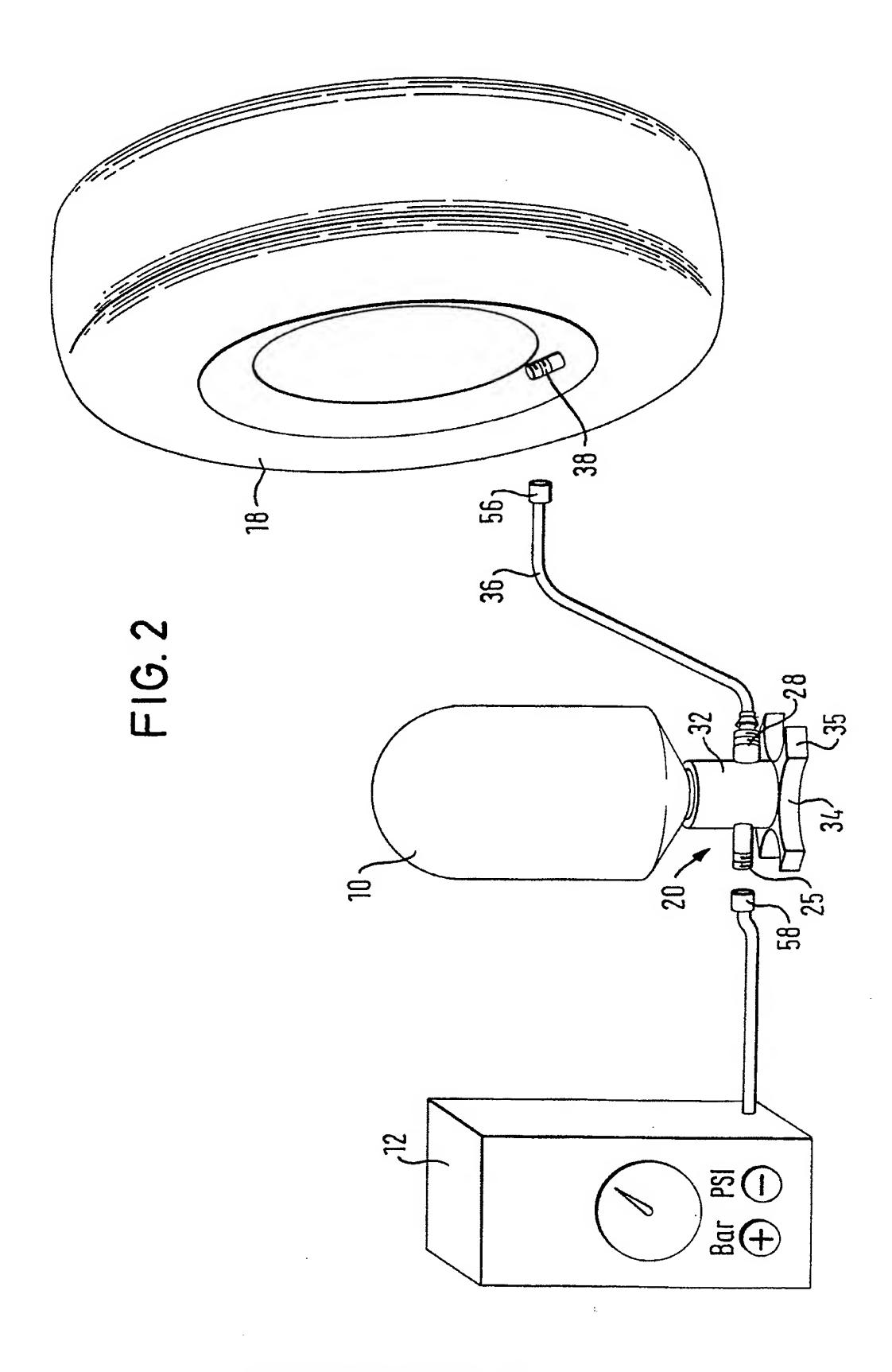
- 7. Vorrichtung nach zumindest einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Einlaßleitung (25) und die Auslaßleitung (28) zumindest bereichsweise, bevorzugt im Bereich von mit dem Behälterinnenraum kommunizierenden freien Enden, koaxial verlaufen.
- 8. Vorrichtung nach zumindest einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß freie Enden der Einlaßleitung (25) und/oder der Auslaßleitung (28) jeweils zum Aufbrechen einer eine Öffnung des Behälters (10) verschließenden Versiegelung ausgebildet, insbesondere abgeschrägt sind.

- 9. Vorrichtung nach zumindest einem der vorhergehenden Ansprüche,
  dadurch gekennzeichnet,
  daß die Entnahmeeinheit (20) einen zumindest im wesentlichen zylindrischen Anschlußabschnitt (32) umfaßt, der an seinem einen
  Ende als Anschlußstutzen (22) für den Behälter (10) ausgebildet ist
  und an dessen anderes Ende sich ein Fußabschnitt (34) anschließt,
  dessen vom Behälter (10) abgewandte Seite als Standfläche ausgebildet ist.
- Vorrichtung nach zumindest einem der vorhergehenden Ansprüche, dadurch gekennzeichnet,
  daß an einen Außenabschnitt (30) einer Auslaßleitung (28) der Entnahmeeinheit (20) eine bevorzugt als Schlauch ausgebildete Fülleitung (36) anschließbar ist, die mit einem Ventil (38) des abzudichtenden Gegenstandes (18) koppelbar ist.

- 11. Vorrichtung nach zumindest einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß sie zur Zwangsentlüftung eines an den Auslaß insbesondere über eine Fülleitung (36) angeschlossenen abzudichtenden Gegenstandes (18) ausgebildet ist.
- 12. Vorrichtung nach zumindest einem der vorhergehenden Ansprüche, dadurch gekennzeichnet,
  10 daß die von der Entnahmeeinheit (20) abgewandte Seite des Behälters (10) als Standfläche ausgebildet ist.
- 13. Vorrichtung nach zumindest einem der vorhergehenden Ansprüche, dadurch gekennzeichnet,
  15 daß ein in der deutschen Patentanmeldung 196 525 46 beschriebenes Abdichtmittel vorgesehen ist.
  - 14. Entnahmeeinheit (20) einer Vorrichtung nach zumindest einem der vorhergehenden Ansprüche.



**ERSATZBLATT (REGEL 26)** 



ERSATZBLATT (REGEL 26)

## INTERNATIONAL SEARCH REPORT

Inter onal Application No PCT/EP 99/07437

A. CLASS IPC 7	B67D5/02 B29C73/16			
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	o International Patent Classification (IPC) or to both national classific	eation and IPC		
}	SEARCHED  ocumentation searched (classification system followed by classificat	ion symbols)		
IPC 7		•		
Documenta	tion searched other than minimum documentation to the extent that s	such documents are included in the fields se	arched	
Electronic d	ata base consulted during the international search (name of data ba	se and, where practical, search terms used		
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	ent defining the general state of the art which is not ered to be of particular relevance	or priority date and not in conflict with to cited to understand the principle or the invention	he application but ory underlying the	
"E" earlier d	locument but published on or after the international ate	"X" document of particular relevance; the ci cannot be considered novel or cannot		
"L" docume which i	nt which may throw doubts on priority claim(s) or is cited to establish the publication date of another	involve an inventive step when the doc  "Y" document of particular relevance; the cl	ument is taken alone	
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4	January 2000	12/01/2000		
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	Tel. (+31-70) 340-2040, Tx. 31 651 epo nl. Fax: (+31-70) 340-3016	Müller, C		

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Nach der Ir	nternationalen Patentklassifikation (IPK) oder nach der nationalen Kl	assifikation und der IPK			
8. RECHE	RCHIERTE GEBIETE				
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	rte aber nicht zum Mindestprüfstoff gehörende Veröffentlichungen, s				
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C. ALS WE	SENTLICH ANGESEHENE UNTERLAGEN				
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	Tel. (+31–70) 340–2040, Tx. 31 651 epo ni, Fax: (+31–70) 340–3016	Müller, C			

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International Bureau



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B65B 31/00

(21) International Application Number:

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English

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(30) Priority Data: 10/285,192

31 October 2002 (31.10.2002) US

(71) Applicant: INTERDYNAMICS, INC. [US/US]; 80 39th Street, Brooklyn, NY 11232 (US).

(72) Inventors: COWAN, David, M.; 523 5th Street, Apt. 2L, Brooklyn, NY 11215 (US). SCHAPERS, Jochen; 353 East 82nd Street #20, New York, NY 10028 (US). TRACTENBERG, Saul; 80 39th Street, Brooklyn, NY 11232 (US).

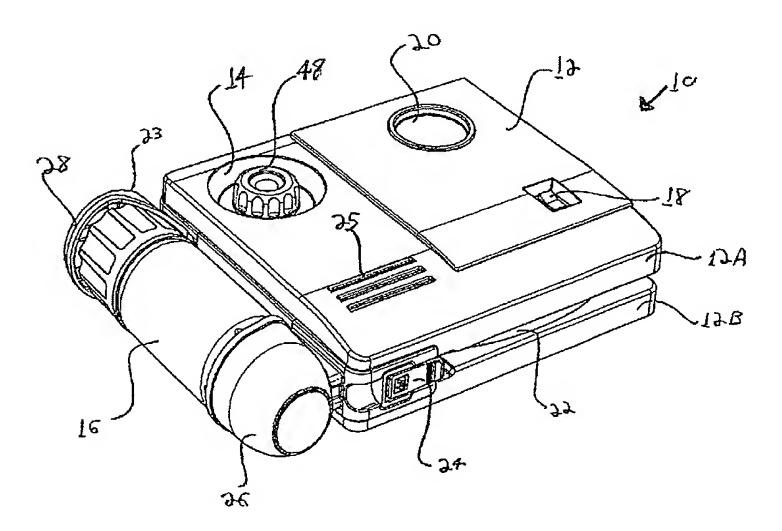
- (74) Agents: BERGER, Peter, L. et al.; Levisohn, Berger & Langsam, LLP, 805 Third Avenue, 19th Floor, New York, NY 10022 (US).
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(54) Title: APPARATUS FOR SEALING, INFLATING, AND REPAIRING TIRES



(57) Abstract: A tire repair device is provided. A receptacle/port is in communication with the air flow path; the receptacle/port is adapted to sealingly receive a container of tire sealant. When the air compressor is activated and a container of tire sealant is received in or secured to the receptacle or port, air from the air compressor is forced into the container and pushes tire sealant out of the container, into and out of the receptacle, into the air flow path, and into a tire. Preferably, the receptacle includes a piercing projection disposed in the receptacle adapted to pierce a seal on a container of tire sealant secured in the receptacle. Preferably, the intake and the exhaust are configured in the receptacle so that both the intake and the exhaust are opposite substantially the same opening of a container of tire sealant received in or secured to in the receptacle.



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# APPARATUS FOR SEALING, INFLATING, AND REPAIRING TIRES BACKGROUND OF THE INVENTION

## Field of the Invention

The invention relates to the field of do-it-yourself automotive repair, and more specifically to devices for sealing and inflating automobile (and similar) tires that may have a leak.

### Description of the Related Art

Automobiles, trucks, sport utility vehicles, and the like typically ride on toroidal rubber tires filled with compressed air. Sometimes, the integrity of a tire can become compromised, either through the age of the tire, a sharp road hazard, or for other reasons. If the tire cannot effectively contain compressed air, it becomes flat and cannot be used. Getting a flat tire can be a major inconvenience or even dangerous, especially if the tire goes flat on a highway or a significant distance away from a service station.

Some effort has been made to provide a portable tire repair kit that can fit in the trunk of an automobile or the cab of a truck and be usable by an ordinary motorist to repair a flat tire. For example, U.S. Patent No. 6,283,172 to Thurner describes a tire repair device having a replaceable bottle containing tire sealant and a self-contained air compressor. The bottle is placed inside the pressurized container, and the compressor is turned on. As the pressure in the pressurized container builds up, because the bottle is flexible, it is compressed, thereby squeezing the sealant from it into the tire. This device is unwieldy and not readily workable because significant pressure is required to squeeze the bottle sufficiently to expel the tire sealant. Moreover, once a tire is inflated, the device needs to be resealed with a new cover at a garage or service station. Also, the device cannot be used as a simple air compressor without a bottle being present.

U.S. Patent No. 6,345,650 to Paasch et al. teaches a tire repair device having a refillable bottle containing tire sealant having an inlet valve on top and an outlet valve on the bottom. One connects the inlet valve to an external source of compressed air such as a fully inflated tire on the vehicle, and the compressed air expels the tire sealant from the bottle and into the flat tire. This device has several

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drawbacks. First, it is dangerous to lower the air pressure in the non-flat tires for the sake of inflating the flat tire; tires with lowered air pressure are more susceptible to rupture. Second, if more than one tire is flat, the remaining non-flat tires may be insufficient to inflate the flat tires. Third, once the motorist uses the device, it must be refilled with tire sealant. Also, the Paasch device does not have its own source of compressed air.

U.S. Patent No. 6,412,524 to Fogal, Sr. discloses a device attachable to a source of pressurized air such as a conventional air compressor. Air is injected into the bottom end via an elbow and out of the top end via a fitting. The air flow path is non-aligned to create cyclonic movement in the chamber. The container is refillable and integral with device, and one must remove the core of the tire valve in order to attach the fitting to the tire.

in all of the above references, the devices disclosed must either be repaired after each use or refilled, an annoying and inconvenient drawback, particularly if more than one tire must be inflated at a given time. Most do not offer a built-in source of compressed air, and not one offers a device in which an integral compressed air source can be used if no tire sealant container is present. That is, the devices described above cannot be used safely as simple air compressors if the need arises. Also, tire sealant, by its very nature, coagulates and hardens into an airtight substance. Yet none of the devices described above address the concern that liquid tire sealant remaining in the dispensing port of the device will harden and form a plug that will prevent the device from being used again.

There is a long-felt need in the art to provide a tire sealing and inflating device that an ordinary motorist can use quickly, easily, and efficiently that does not suffer from the above drawbacks.

### SUMMARY OF THE INVENTION

Accordingly, it is an object of the invention to provide a tire repair device that will allow an ordinary motorist to be able to repair and inflate a flat tire while the tire is still on the wheel of a vehicle.

It is another object of the invention to provide a tire repair device that can be reused repeatedly.

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It is still another object of the invention to provide a tire repair device that can be reused repeatedly without fear of having the air line blocked by hardened tire sealant.

It is another object of the invention to provide a tire repair device that can be reused repeatedly and recharged with tire sealant easily.

Still a further object of the invention is to provide a tire repair device that can be used as a conventional air compressor when it is not needed to repair a tire.

The above and other objects are fulfilled by the invention, which is a tire repair device having a housing, an air compressor disposed within the housing, and an air flow path from the air compressor adapted to be connected to a tire. A receptacle and/or port is formed in the housing in communication with the air flow path; the receptacle or port is adapted to sealingly receive a container of tire sealant. When the air compressor is activated and a container of tire sealant is secured to/received in the receptacle/port, air from the air compressor is forced into the container and pushes tire sealant out of the container, into the receptacle, into the air flow path and into a tire. Preferably, the receptacle includes an intake that receives air from the air flow path upstream of the receptacle and an exhaust that returns air to the air flow path downstream of the receptacle. When a container of tire sealant is received in the receptacle, the intake directs air from the air flow path substantially into the container, and the exhaust receives air and tire sealant from the container and directs the air and tire sealant into the air flow path. Preferably, the receptacle includes a piercing projection disposed in the receptacle adapted to pierce a seal on a container of tire sealant that is receivable in the receptacle. Preferably, the intake and the exhaust are configured in the receptacle so that both the intake and the exhaust are opposite substantially the same opening of a container of tire sealant received/secured in the receptacle. In one embodiment, a check valve may be disposed on the intake to prevent air and tire sealant form entering the intake.

The air flow path preferably terminates in a hose which terminates in a chuck adapted to sealingly engage a conventional tire valve. A chuck holder is disposed on an exterior of the housing having a substantially annular depression and a central projection shaped to fit inside the chuck when the chuck is in a storage configuration

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and not in use. That is, the chuck is placed on the chuck holder, and the central projection enters the chuck to prevent a glob of tire sealant from hardening and clogging the chuck.

The invention also includes an unpressurized container of tire sealant for use with the above-described tire repair device. The container includes a plastic container housing, sufficient tire sealant within the container housing to repair a flat conventional automobile tire, an opening in the housing, and a membranous seal covering the opening. When the container is secured to the receptacle of the tire repair device, the container's opening substantially opposes the intake and the exhaust. When the container is placed in the receptacle, the piercing projection pierces the membranous seal on the container to allow air from the intake to enter the opening and air and the tire sealant to exit the opening and enter the exhaust. The container is preferably disposable.

When no container is in the device's receptacle, the device functions like a conventional air compressor and can inflate tires. Because the air pressure of a conventional air compressor can be quite high, and because it is not cost effective to use containers that have a burst pressure in excess of the conventional compressor air pressure, a pressure relief valve is disposed in the air flow path to limit the air pressure to a predetermined level in the device when the air compressor is operating. That predetermined pressure level is below a burst pressure of a container of tire seafant to be used with the device. Accordingly, the disposable containers to be used with the device need not be expensive yet will not explode or rupture during use. By the same token, when one is using the device as a conventional air compressor, one would like to be able to achieve the maximum pressure available by the compressor. To wit, a pressure relief override switch is mechanically engageable with the pressure relief valve; operation of the pressure relief override switch disables the pressure relief valve and allows the air pressure to exceed the predetermined level.

Alternate embodiments are also contemplated. Specifically, the invention also includes the container-receiving port mentioned above in a form in which the port is separate from the air compressor and has an intake that receives air from a separate air compressor upstream of the port and an exhaust downstream of the

port. The port may be a separate attachment that can be secured to a container of tire sealant, or it may be integral with a disposable container of tire sealant. As another alternative, an aerosol or pressurized container may be employed in which the contents of the container are pressurized and actively expelled from the container rather than being forced out by air from the air compressor. The pressurized container may have an activation switch for selectively allowing the tire sealant to be expelled, so that when the air compressor and the activation switch are activated, the tire sealant is expelled from the pressurized container and is entrained along with the air from the air compressor.

#### BRIEF DESCRIPTION OF THE DRAWINGS

- Fig. 1 is a perspective view of a tire repair device in accordance with the invention.
  - Fig. 2 is a partial front elevation view of the tire repair device of Fig. 1.
- Fig. 3 is a perspective view of a receptacle port for a tire device in accordance with the invention.
  - Fig. 4 is an exploded side view of the receptacle port of Fig. 3.
  - Fig. 5 is a sectional view of the receptacle port of Fig. 3.
- Fig. 6 is a perspective view of a tire repair device in accordance with the invention with the air hose removed to show the chuck holder.
- Fig. 7 is a partial front elevation view of a tire repair device in accordance with the invention with the air hose removed to show the chuck holder.
  - Fig. 8 is a sectional view of the chuck holder of Figs. 6 and 7.
- Fig. 9 is an exploded perspective view of a tire repair device in accordance with the invention.
  - Fig. 10 is an exploded perspective view of an alternative receptacle port.
- Fig. 11 is a side elevation view of another embodiment of the containersecuring port of the invention.
- Fig. 12 is a schematic perspective view of an alternative embodiment of the overall inventive device having a reservoir.
- Fig. 13 is a schematic perspective view of an alternative embodiment of the overall inventive device having an aerosol or pressurized container.

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Figs. 14A-B are side and top elevation view, respectively, of a disposable inventive tire repair container.

# DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS AND DRAWINGS

The invention will now be described with reference to Figs. 1-14 appended hereto. It should be noted that these drawings are exemplary in nature and in no way serve to limit the scope of the invention, which is defined by the claims appearing hereinbelow.

As shown in perspective in Fig. 1, the inventive tire repair device 10 has some features of a conventional portable air compressor in addition to many new features which enable device 10 not only to inflate a flat tire but also to repair a leak in a flat tire at substantially the same time. The device 10 has a housing 12 which may be made from upper and lower halves 12A and 12B. Alternatively, the housing may be constructed from any convenient number of pieces. A receptacle 14 is formed in the housing 12 for receiving an unpressurized bottle 16 of tire sealant in a manner to be described below. Housing 12 may include a bottle clamp 23 having brackets 26 and 28 projecting from flanges 27 and 29 for securing a bottle 16 to the side of device 10. The device may optionally be provided with an on-off switch 18 and a pressure gauge 20. Air hose 22 is connected to the air compressor 60 (see Fig. 9) inside housing 12, and the free end of hose 22 terminates in a chuck 24 suitable for attaching to a tire valve. As shown in Fig. 9, chuck 24 includes typical components such as lever 24A, core depressor 24B, collet 24C, body 24D, and pin 24E. Device 10 may also be provided with air vents 25 to allow the air compressor an intake source of air. The device may be connectable to and powered by an automobile cigarette lighter via adapter 80 (see Fig. 9).

Housing 12 includes a chuck holder 30 for storing chuck 24 when device 10 is not in use. With reference to Figs. 2 and 6-8, chuck holder 30 includes an annular depression or well 32 shaped to receive the annular body 24D of chuck 24. Disposed substantially centrally within well 32 is projection 34 which is shaped to project into body 24D when chuck 24 is fitted into holder 30. Well 32 helps keep chuck 24 around projection 34, and projection 34 prevents a glob of tire sealant

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residue from remaining in and hardening within (and thus partially or totally blocking) chuck body 24D.

As mentioned above, housing 12 includes receptacle 14 into which bottle 16 may be disposed in order to provide tire sealant to the system. Sealant receiving port 40, best illustrated in Figs. 3-5 and 9, is disposed in receptacle 14 for the purposes of injecting air from air compressor 60 into bottle 16 when the bottle is disposed in receptacle 14 and for accepting tire sealant forced out of the bottle by way of the high pressure compressed air injected therein. Flange 40A preferably helps seat port 40 within receptacle 14; other known means of securing the port within the receptacle are also contemplated. Port 40 includes an intake nozzle 41 connected to air compressor 60 (see Fig. 9); internal bore 42 forms an intake air flow path through nozzle 41 which passes through central projection 45 and terminates in intake hole 46. Air coming into nozzle 41 travels in the direction of arrow A of Fig. 5 from air compressor 60 via hose 62. Port 40 also includes an exhaust nozzle 43 connected to hose 22 and chuck 24 (see Fig. 9); internal bore 44 forms an exhaust air flow path which terminates in exhaust hole 47. Air (and sometimes tire sealant) exiting from nozzle 43 travels in the direction of arrow B of Fig. 5 and into hose 22 and thence chuck 24. When the bottle is not being used and the device 10 must function like a conventional air compressor, cap 48 is screwed into threads 49 of port 40 and sealed with gasket 50 so that compressed air will not leak out of port 40.

Additional details of bottle 16 are provided in Fig. 9. Bottle 16 is preferably provided with a single opening 17 which is sealed with a thin membranous covering or seal 19 of at least one of paper, foil, rubber, plastic, or the like. The neck of the bottle is provided with threads 17A which are adapted to matingly engage threads 49 of port 40. A cap 16A is also preferably provided having internal threads 17B also matingly engageable with threads 17A of bottle 16. A snap-on cap (not shown) or other known or to-be-designed types of caps may also be employed.

When it is desired to install a bottle of tire sealant into receptacle 14, cap 16A is removed from bottle 16. Threads 17A of bottle 16 are aligned with threads 49 of port 40, and the bottle is screwed into place. As the bottle moves deeper into port 40, seal 19 comes closer and closer to projection 45 until projection 45 ultimately pierces seal 19. If air compressor 60 is not on, seal 19 can still maintain closure of

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opening 17 of bottle 16 around projection 45. When air compressor 60 is activated, air is forced into port 40 via nozzle 41 and up through bore 42, exiting via intake hole 46 in projection 45. Since intake hole 46 is, at this point, within bottle 16, air is injected into bottle 16. As air enters the bottle, punctured seal 19 bows and ruptures allowing tire sealant and air to be expelled from bottle 16. The tire sealant and air has nowhere to go except down exhaust hole 47, along bore 44, and out of port 40 via nozzle 43 into hose 22 and ultimately into a tire via chuck 24.

Other tire sealing devices that employ containers of tire sealant typically will use pressurized containers. These are dangerous to keep in the trunk or hatch of an automobile since the temperature variations of these storage places can be extreme and can cause a pressurized container to rupture or explode. Pressurized containers are also more difficult and more expensive to ship. Some tire sealing devices employ non-pressurized containers of tire sealant. In every case known to the inventors, conventional non-pressurized containers of this type are pumped with air at one end of the container, and the tire sealant is forced out of the container at the opposite end of the container. Such a design requires at least two seals and a custom-made container.

By contrast, the instant invention's bottle has only one opening and requires only one seal. It is easier and less expensive to manufacture than the above-mentioned two-seal containers and can be a conventional bottle. Also, the central projection 45 makes a seal with the membranous seal 19 when the bottle is inserted into receptacle 14 in a manner similar to a hypodermic needle making a seal with the rubber seal on a via of medicine. Projection 45 seals with seal 19 even if bottle 16 is not fully seated into receptacle 14 (as long as the air compressor has not been activated).

When using device 10 as an ordinary tire inflating air compressor, cap 48 is screwed tightly into port 40. The air flow path begins at compressor 60, travels through hose 62, enters port 40 at intake nozzle 41, exits port 40 at nozzle at exhaust nozzle 43, travels along hose 22, and passes out of the system at chuck 24. In such a usage, one would like to be able to achieve as high an air pressure as possible to make the tire inflation process as speedy as possible. Typical portable air compressors can produce air pressures of up to 250 psi. However, when the

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device is used as a tire sealer, bottle 16 is placed in line with the air flow path, and air entering port 40 is forced into bottle 16, exits bottle 16, and then continues on out of port 40 via nozzle 43 as above. Thus, bottle 16 is subjected to the air pressure produced by the air compressor. Since bottle 16 is meant to be disposable, it is desirable to be able to manufacture a bottle that need not withstand such great air pressures.

As a result, device 10 may preferably be provided with a pressure relief valve 70 to reduce the amount of pressure in the air flow path. In the preferred embodiment, pressure gauge 20 is connected to air compressor 60 via hoses 64 and 68; a T-connector is disposed between hoses 64 and 68. Pressure relief valve 70 includes conventional components such as a valve body 71, ball 72, spring 73, plunger 74, and cap 75. When air compressor 60 is activated, the pressure generated in the air flow path can reach up to 250 psi. However, pressure relief valve 70 is configured to open if the pressure exceeds a much lower valve, e.g., 120 psi. In this way, the pressure in the air flow path is prevented from exceeding 120 psi, and a much less durable bottle need be utilized for bottle 16 since it only needs to be able withstand 120 psi of pressure as opposed to 250 psi. For example, it is contemplated that bottle 16 may advantageously be made from polyethylene terephthalate (PET) plastic or a similar polymer. To allow for a safety factor, the bottle may be designed to withstand pressures of between 140-190 psi.

Button 76 is provided so that a user may override pressure relief valve 70 when the device is being used as a conventional air compressor. That is, the user can depress button 76 to prevent the pressure relief valve 70 from opening when the air pressure exceeds the set point of the valve (e.g., 120 psi). Button 76 may be of the type that requires the user to press continually on the button in order to override pressure relief valve 70 as a safety feature. In this way, the button cannot be left in the depressed position inadvertently when one wishes to use the device as a tire sealer to thereby avoid the risk of rupturing bottle 16 when it is in place. However, it is also contemplated that a button may be provided which, once depressed, stays depressed until re-depressed (and thus disengaged). Other concepts contemplated as within the scope of the invention are a button or pressure relief valve integral with

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receptacle 14 or port 40 which will automatically reduce the air pressure to the valve set point level when a bottle is screwed into port 40.

The tire sealant mentioned above is preferably delivered in single-use bottles which are disposable after being emptied. One tire sealant compound that may advantageously be used in connection with the above device is a compound made by Hydrosol, or another compound made by Airosol Systems, Inc. and described in U.S. Patent No. 5,338,776 to Peelor et al., the teachings of which are incorporated by reference herein. The compound may include an acrylic resin dissolved in a suitable solvent. A typical bottle holds approximately 12 fluid ounces of sealant; of course, the amount of sealant in the bottle may be varied and still remain within the scope of the invention.

Variations in the above invention are contemplated. For example, the bottle receiving port is shown as a separate component that fits within a receptacle in the housing of the device. However, portions of or all of the port may be made integral with the housing. In addition, as shown in Fig. 10, a check valve 52 may be disposed in port 40 to prevent back flow of tire sealant into the air intake of the port. Pin 54 may secure check valve 52 in place over the appropriate hole. Also, the precise configuration of the air flow path described above is merely one possible configuration.

Several different combinations of the various inventive elements are also contemplated, as shown in Figs. 11-14. In Fig. 11, port 140 is substantially similar to port 40 described above. However, port 140 is not necessarily physically connected to the housing of the device. Port 140 includes intake nozzle 141 and exhaust nozzle 143. Intake nozzle 141 may be formed as a tire stem valve directly connectable to an air source such as an external air compressor, or it may be merely the same air flow path as described in Fig. 9 with the port being extendable from the housing yet still attached to the internal air compressor 60. As another alternative, port 140 may be provided as its own separate attachment with its own two hoses, attachable at one end to an air compressor and at the other to a tire, with a bottle being securable on top when cap 148 is removed. In any of these embodiments, port 140 may be provided with hose 122 and chuck 124 similar to hose 22 and chuck 24 described above.

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Another configuration of the invention is described in Fig. 12. Here, device 210 includes a reservoir 215 having an orifice 214 exposed on the housing. In use, one removes the cap (not shown) from orifice 214, pours tire sealant into reservoir 215, replaces the cap on orifice 214, and activates switch 18 to turn on the air compressor. An intake forces air from the air compressor into the reservoir, and an exhaust receives air and tire sealant and directs them along hose 22 in the manner described above. If no tire sealant is contained within reservoir 215, device 210 will function as a conventional air compressor (as long as the cap is secure on orifice 214).

A fourth configuration of the device is shown in Fig. 13. Device 310 is provided with a pressurized or aerosol container 316 instead of the unpressurized bottle 16 described above. In this embodiment, the receptacle 314 that receives container 316 is shown as part of flange 327; in the alternative, it is contemplated to be provided on the housing as with the other embodiments. Container 316 is provided with an activation switch/button/lever 319. Depressing the switch/button/lever allows the contents of the container to leave the container. In use, the air compressor is activated via on-off switch 18, and air is transmitted to the tire. When switch 319 is also activated, tire sealant escapes container 316 and is emitted into the air flow path and entrained with the air heading towards the tire.

Fig. 14 describes another embodiment of the inventive container. Here, container 416 is provided with an integral port 440 having an intake 441 and an exhaust 443. Intake 441 is adapted to receive air from an external source. Exhaust 443 is connectable to a tire valve, either directly as a tire valve adaptor or via a hose similar to hose 22 and chuck 24.

Having described the invention, it should be understood that the scope of the invention is not limited to the above description but rather is defined by the claims appearing hereinbelow. Modifications to the above description that include that which is known in the art are well within the scope of the contemplated invention.

#### What is claimed is:

1. A tire repair device, comprising:

a housing;

an air compressor disposed within said housing;

an air flow path from said air compressor adapted to be connected to a tire; and

a receptacle formed in said housing in communication with said air flow path adapted to sealingly receive a container of tire sealant,

wherein when said air compressor is activated and a container of tire sealant is received in said receptacle, air from said air compressor is forced into the container and pushes tire sealant out of the container, into said receptacle, into said air flow path, and into the tire.

2. A tire repair device according to Claim 1, wherein said receptacle comprises: an intake that receives air from said air flow path upstream of said receptacle; and

an exhaust that returns air to said air flow path downstream of said receptacle.

- 3. A tire repair device according to Claim 2, wherein when a container of tire sealant is received in said receptacle, said intake directs air from said air flow path substantially into the container, and said exhaust receives air and tire sealant from the container and directs the air and tire sealant into said air flow path.
- 4. A tire repair device according to Claim 3, further comprising a check valve disposed on said intake to prevent air and tire sealant form entering said intake.
- 5. A tire repair device according to Claim 1, further comprising a piercing projection located in said receptacle adapted to pierce a seal on a container of tire sealant that is receivable in said receptacle.
- 6. A tire repair device according to Claim 3, further comprising a piercing projection located in said receptacle adapted to pierce a seal on a container of tire sealant that is receivable in said receptacle.
- 7. A tire repair device according to Claim 6, wherein said intake is located within said piercing projection and communicates with an outside of said piercing projection.

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8. A tire repair device according to Claim 1, wherein said air flow path terminates in a hose which terminates in a chuck adapted to sealingly engage with a conventional tire valve.

- 9. A tire repair device according to Claim 8, further comprising a chuck holder formed on an exterior of said housing, having a substantially annular depression and a central projection shaped to sealingly fit inside said chuck when said chuck is in a storage configuration and not in use.
- 10. A tire repair device according to Claim 2, wherein said intake and said exhaust are configured in said receptacle so that both said intake and said exhaust are opposite substantially the same opening of a container of tire sealant received in said receptacle.
- 11. An unpressurized container of tire sealant for use with the tire repair device of Claim 1, comprising a plastic container housing and sufficient tire sealant within said container housing to repair a flat conventional automobile tire.
- 12. An unpressurized container of tire sealant according to Claim 11, further comprising an opening in said housing and a membranous seal covering said opening.
- 13. An unpressurized container of tire sealant for use with the tire repair device of Claim 2, comprising:

a plastic container housing and sufficient tire sealant within said container housing to repair a flat conventional automobile tire, wherein when said container is received in said receptacle, said opening substantially opposes said intake and said exhaust.

- 14. An unpressurized container of tire sealant for use with the tire repair device of Claim 5, comprising a plastic container housing having an opening;
  - a membranous seal covering said opening; and

sufficient tire sealant within said housing to repair a flat conventional automobile tire,

wherein when said container is received in said receptacle, said piercing projection pierces said membranous seal on said container to allow air from said intake to enter said opening and air and said tire sealant to exit said opening and enter said exhaust.

- 15. An unpressurized container according to Claim 11, wherein said container is disposable.
- 16. An unpressurized container according to Claim 12, wherein said container is disposable.
- 17. An unpressurized container according to Claim 13, wherein said container is disposable.
- 18. An unpressurized container according to Claim 14, wherein said container is disposable.
- 19. An unpressurized container according to Claim 12, said membranous seal comprising a thin sheet of at least one of paper, plastic, rubber, and metal foil.
- 20. An unpressurized container according to Claim 14, said membranous seal comprising a thin sheet of at least one of paper, plastic, rubber, and metal foil.
- 21. A tire repair device according to Claim 1, wherein when no container is received in said receptacle, said device functions like a conventional air compressor and can inflate tires.
- 22. A tire repair device according to Claim 1, further comprising a pressure relief valve, disposed in said air flow path, to limit the air pressure to a predetermined level in said device when said air compressor is operating.
- 23. A tire repair device according to Claim 22, wherein said predetermined level is below a burst pressure of a container of tire sealant to be used with said device.
- 24. A tire repair device according to Claim 21, further comprising a pressure relief valve, disposed in said air flow path, to limit the air pressure to a predetermined level in said device when said air compressor is operating.
- 25. A tire repair device according to Claim 24, further comprising a pressure relief override switch mechanically engageable with said pressure relief valve, wherein operation of said pressure relief override switch disables said pressure relief valve and allows the air pressure to exceed said predetermined level.
- 26. A tire repair device according to Claim 1, further comprising a clamp projecting from a side of said housing, said clamp adapted to secure a bottle of tire sealant to said side of said housing.

27. A tire repair device, comprising:

a housing;

an air compressor disposed within said housing;

an air flow path from said air compressor adapted to be connected to a tire;

a receptacle formed in said housing in communication with said air flow path;

and

a port disposed in said receptacle in communication with said air flow path adapted to sealingly receive a bottle of tire sealant,

wherein when said air compressor is activated and a bottle of tire sealant is received in said receptacle, air from said air compressor is forced into the bottle and pushes tire sealant out of the bottle, into said receptacle, into said air flow path, and into the tire.

28. A tire repair device according to Claim 27, wherein said port comprises: an intake that receives air from said air compressor upstream of said port; and

an exhaust that returns air to said air flow path downstream of said port.

- 29. A tire repair device according to Claim 28, further comprising a hose connected to said exhaust, wherein air exiting said port enters said hose.
- 30. A tire repair device according to Claim 29, wherein when a bottle of tire sealant is secured to said port, said intake directs air from said air flow path substantially into the bottle, and said exhaust receives air and tire sealant from the bottle and directs the air and tire sealant into said air flow path.
- 31. A tire repair device according to Claim 29, said port comprising: an intake nozzle in communication with said air compressor; and an exhaust nozzle in communication with said hose.
- 32. A tire repair device according to Claim 31, said port further comprising:
  threads adapted to matingly engage threads on a bottle of tire sealant; and
  a projection in communication with said intake nozzle adapted to pierce a seal
  of a bottle of tire sealant threaded into said port.

- 33. A tire repair device according to Claim 32, wherein said intake and said exhaust are configured in said port so that both said intake and said exhaust are opposite substantially the same opening of a bottle of tire sealant threaded into said port.
- 34. An unpressurized bottle of tire sealant for use with the tire repair device of Claim 27, comprising a plastic bottle housing and sufficient tire sealant within said bottle housing to repair a flat conventional automobile tire.
- 35. An unpressurized bottle of tire sealant according to Claim 34, further comprising an opening in said bottle housing and a membranous seal covering said opening.
- 36. An unpressurized bottle of tire sealant for use with the tire repair device of Claim 28, comprising:
- a plastic bottle housing and sufficient tire sealant within said bottle housing to repair a flat conventional automobile tire, wherein when said bottle is secured to said port, said opening substantially opposes said intake and said exhaust.
- 37. An unpressurized bottle of tire sealant for use with the tire repair device of Claim 32, comprising a plastic bottle housing having an opening;
  - a membranous seal covering said opening; and
- sufficient tire sealant within said bottle housing to repair a flat conventional automobile tire,

wherein when said bottle is secured to said port, said projection pierces said membranous seal on said bottle to allow air from said intake to enter said opening and air and said tire sealant to exit said opening and enter said exhaust.

38. A tire repair device, comprising:

a port adapted to sealingly receive a bottle of tire sealant; an intake that receives air from an air compressor upstream of said port; an exhaust downstream of said port; and

an air flow path from said exhaust adapted to be connected to a tire;

wherein when a bottle of tire sealant is secured to said port, said intake directs air from the air compressor substantially into the bottle, and said exhaust receives air and tire sealant from the bottle and directs the air and tire sealant into said air flow path and into the tire.

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39. A tire repair device, comprising:

a housing;

an air compressor within said housing;

an air flow path from said air compressor adapted to be connected to a tire; and

a port in communication with said air flow path adapted to sealingly receive a bottle of tire sealant,

wherein when said air compressor is activated and a bottle of tire sealant is sealingly received in said port, air from said air compressor is forced into the bottle and pushes tire sealant out of the bottle, into said port, into said air flow path, and into the tire.

- 40. A tire repair device according to Claim 39, wherein said port is seated in a receptacle formed in said housing.
- 41. A tire repair device according to Claim 39, wherein said port is in communication with said air flow path via a hose and is extendable from said housing.
- 42. A tire repair device, comprising:

a housing;

an air compressor within said housing;

an air flow path from said air compressor adapted to be connected to a tire; and

a reservoir formed in said housing in communication with said air flow path adapted to receive tire sealant,

wherein when said air compressor is activated and tire sealant is received in said reservoir, air from said air compressor is forced into said reservoir and pushes tire sealant out of said reservoir, into said air flow path, and into the tire.

- 43. A tire repair device, comprising:
  - a housing;

an air compressor within said housing;

an air flow path from said air compressor adapted to be connected to a tire; and

a receptacle formed in said housing in communication with said air flow path adapted to sealingly receive a container of tire sealant,

wherein when said air compressor is activated and a container of tire sealant is received in said receptacle, tire sealant leaves the container and is entrained into said air flow path, and enters the tire.

44. A tire repair device according to Claim 43, further comprising a pressurized container of tire sealant sealingly receivable with said receptacle, said pressurized container having an activation switch for selectively allowing the tire sealant to be expelled,

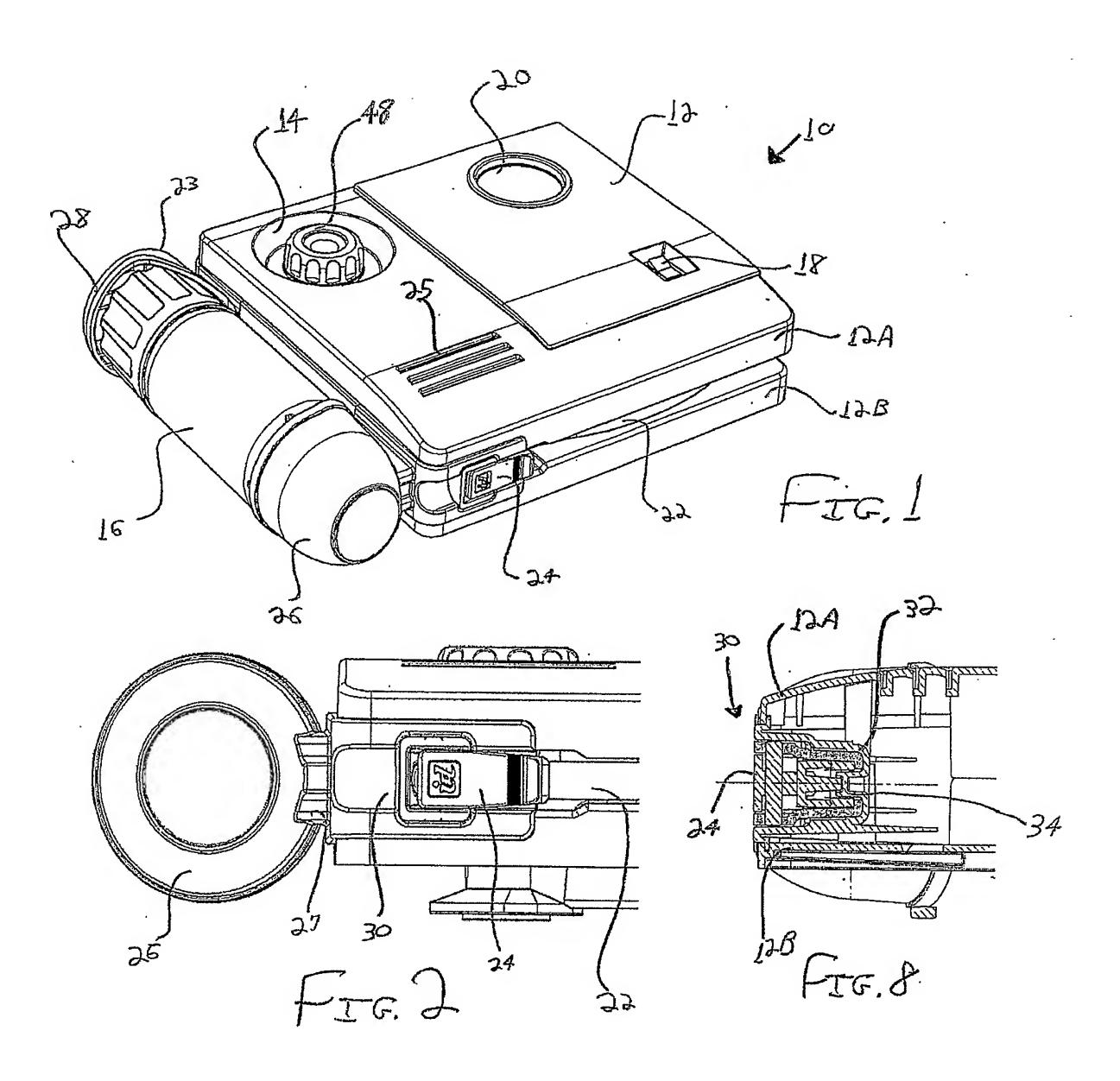
wherein when said air compressor and said activation switch are activated, the tire sealant is expelled from said pressurized container and is entrained along with the air from said air compressor.

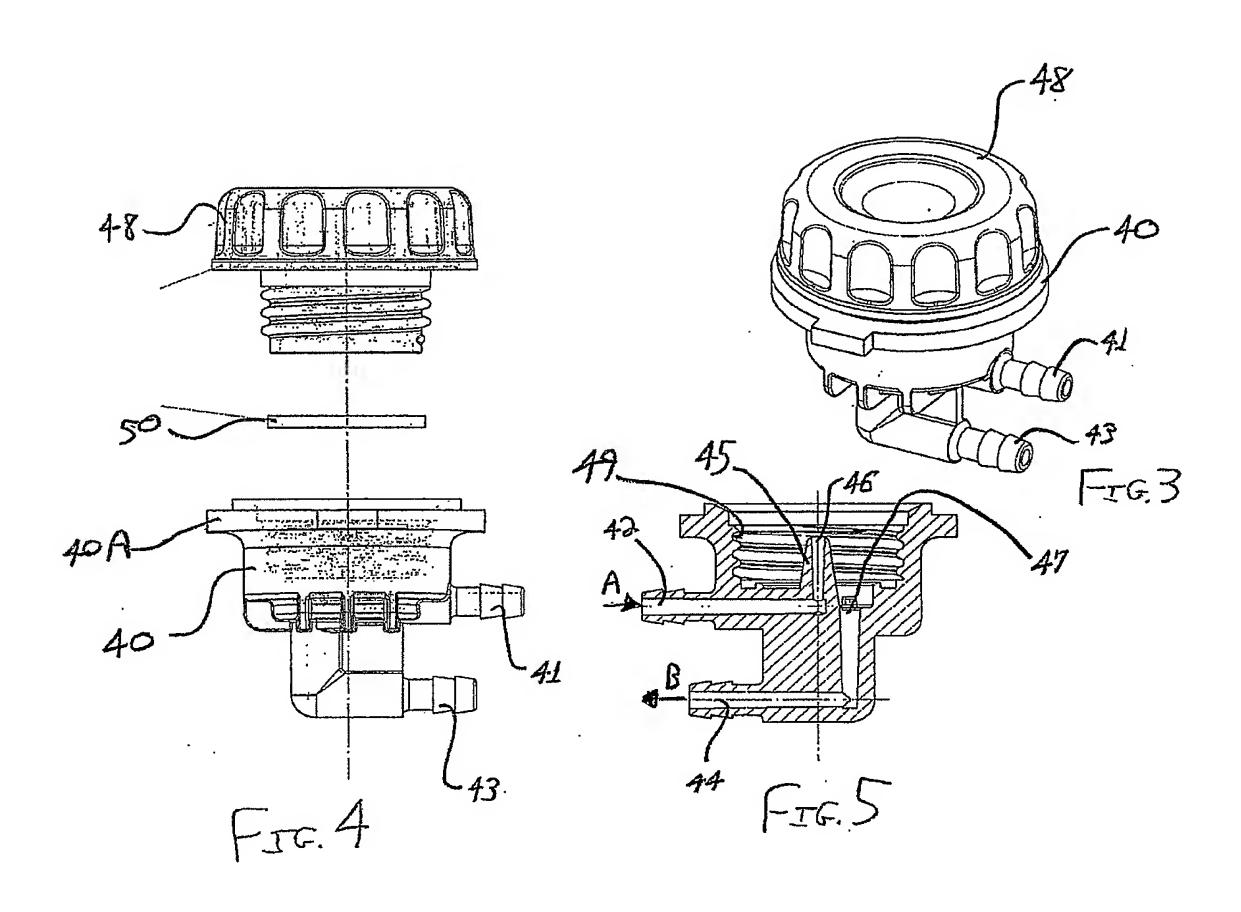
- 45. A disposable tire repair device, comprising:
  - a container of tire sealant;

a port sealingly secured to said container of tire sealant, said port including an intake that receives air from an air compressor upstream of said port, and an exhaust downstream of said port; and

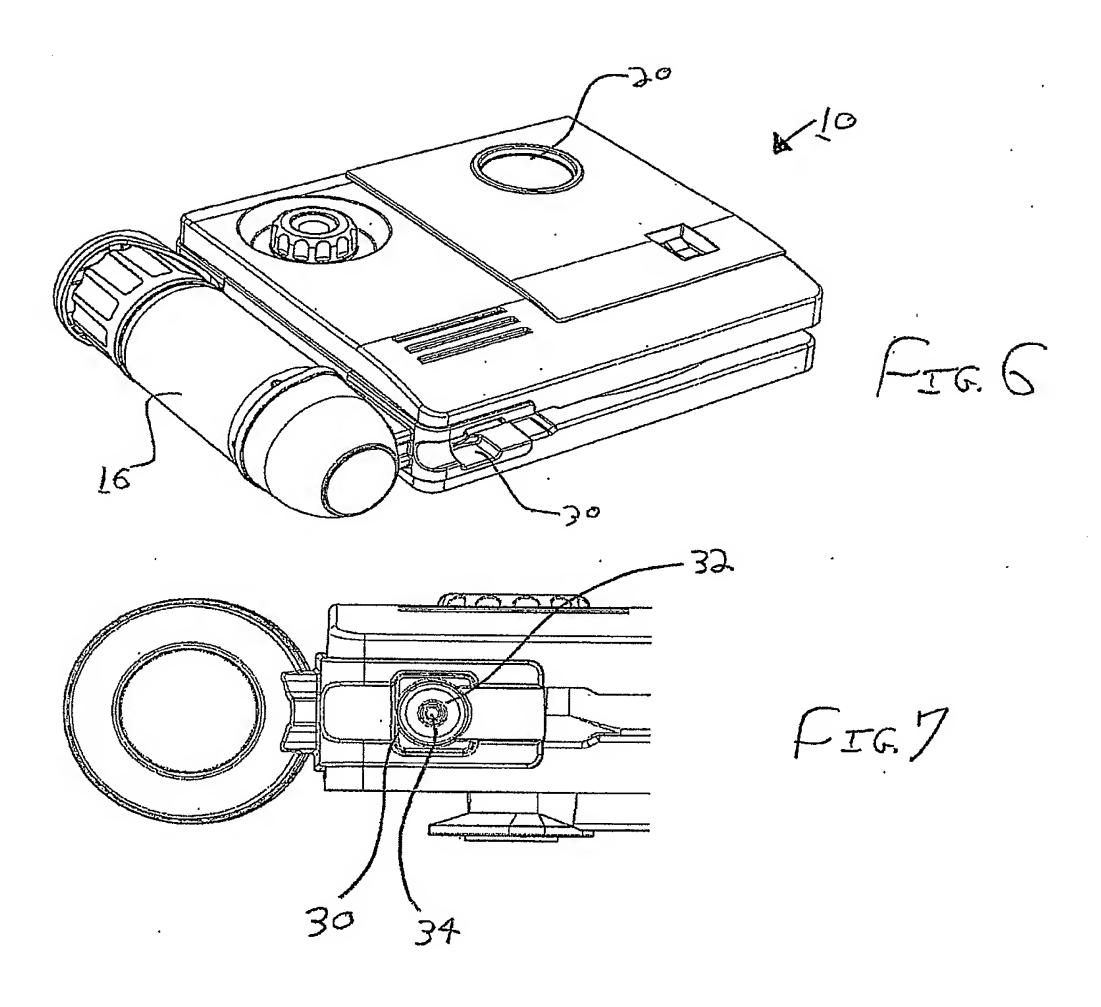
an air flow path from said exhaust adapted to be connected to a tire; wherein the air compressor is activated, said intake directs air from the air compressor substantially into said container, and said exhaust receives air and tire sealant from said container and directs the air and tire sealant into said air flow path and into the tire.

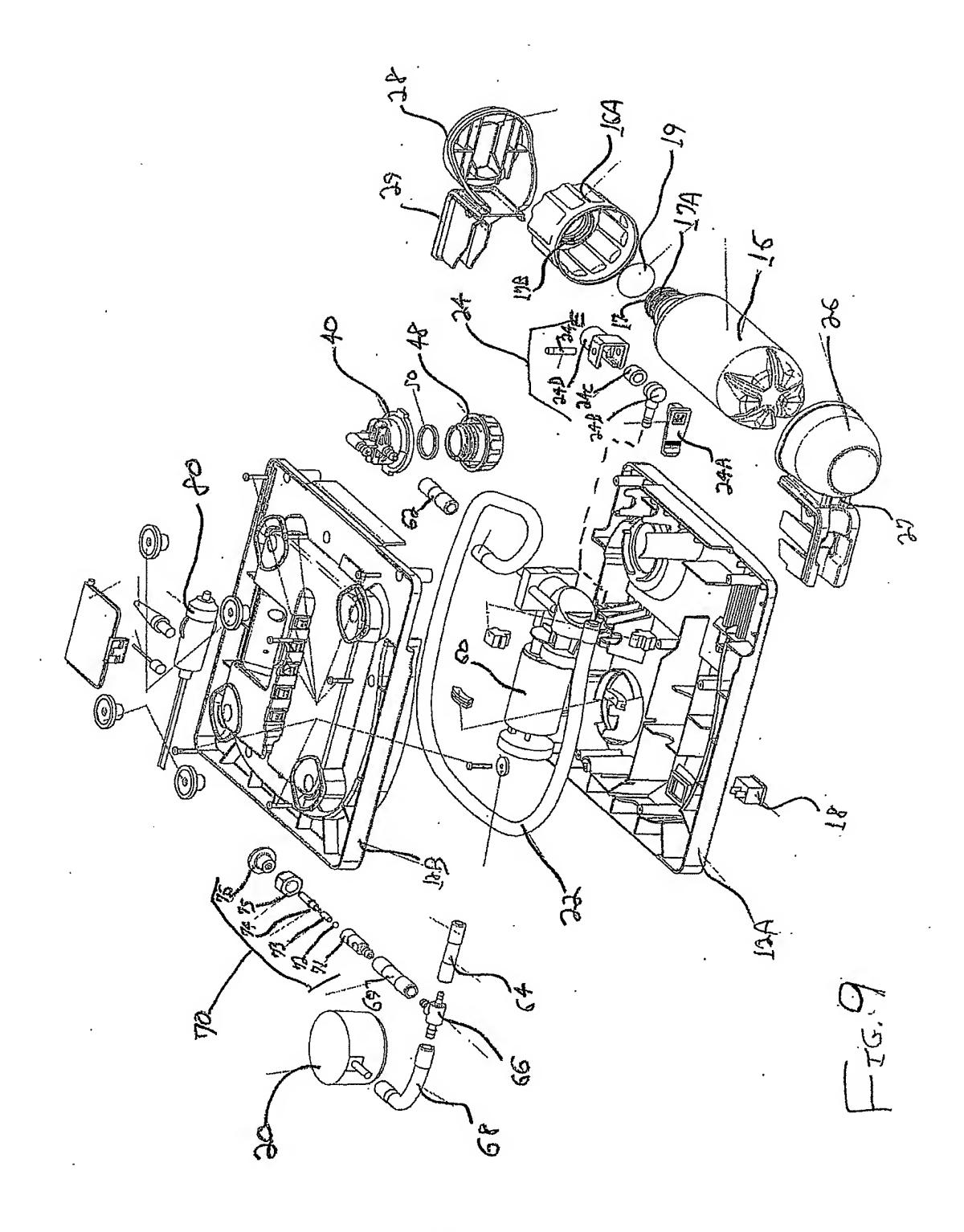
- 46. A disposable tire repair device according to Claim 45, wherein said air flow path comprises a hose attachable to a tire valve.
- 47. A disposable tire repair device according to Claim 45, wherein said air flow path comprises a tire valve adaptor stem.





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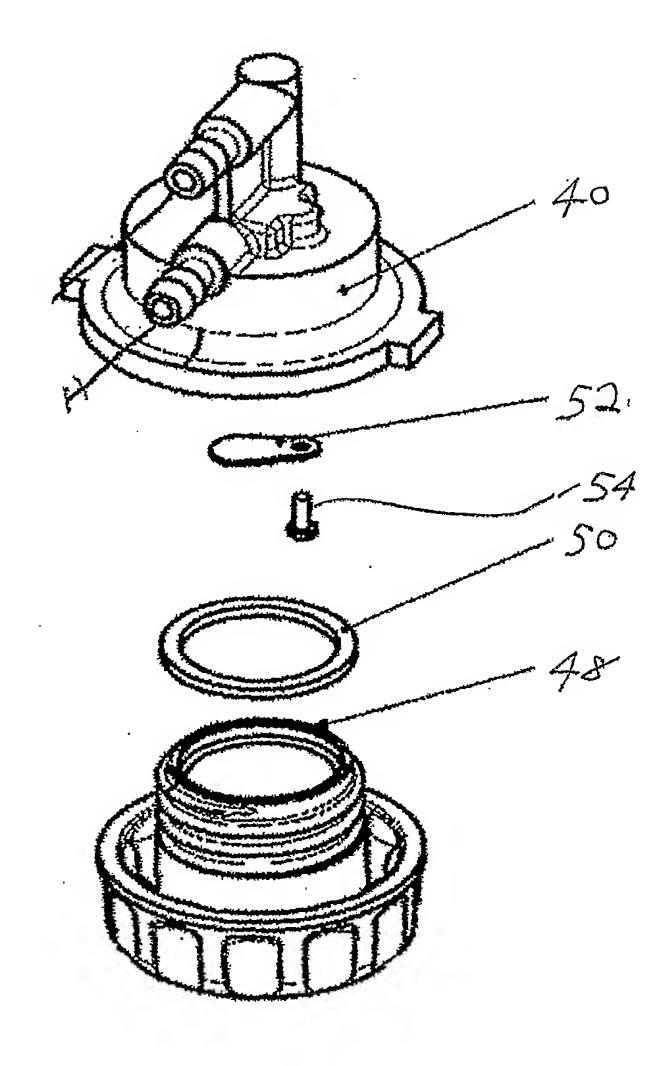
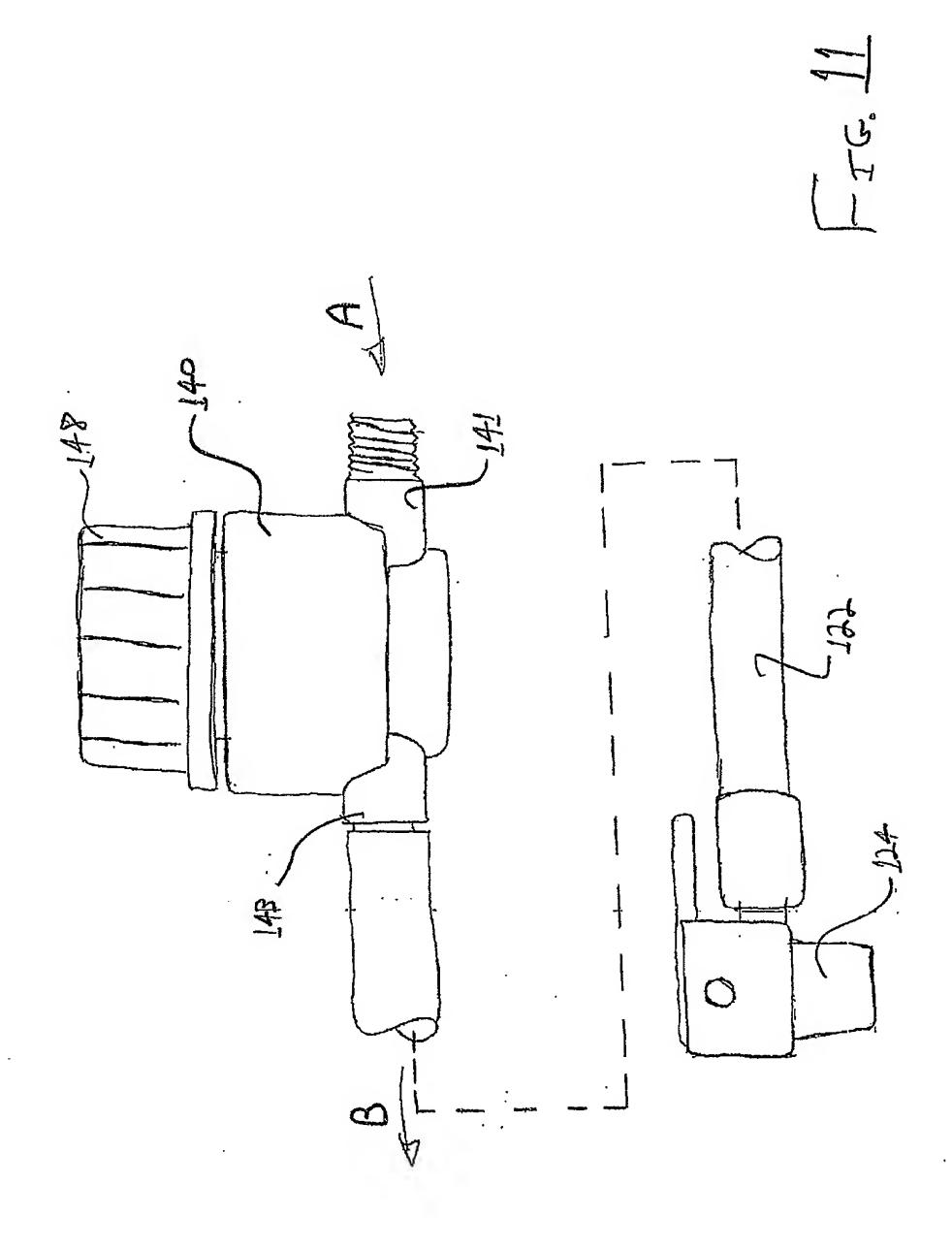
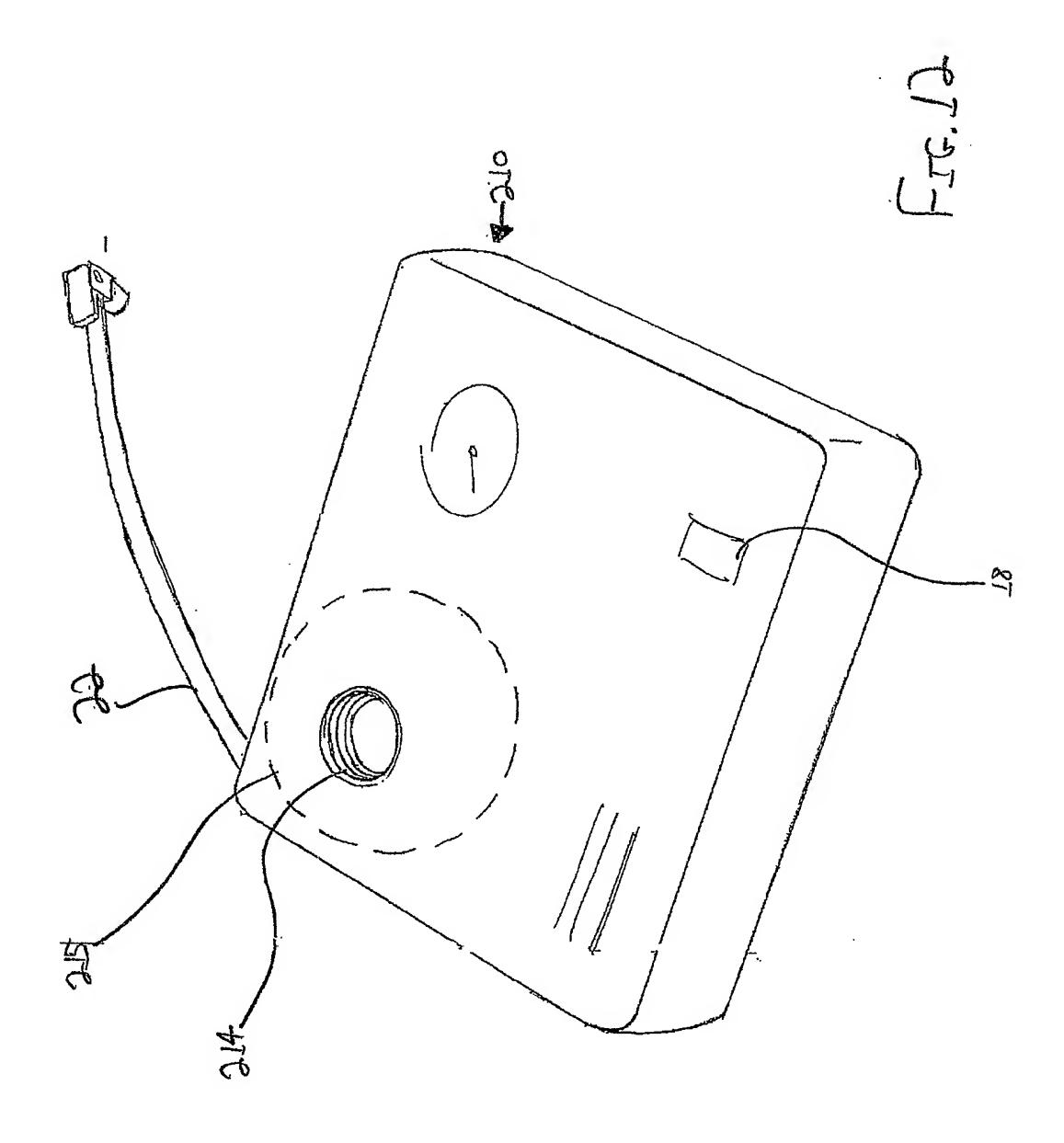
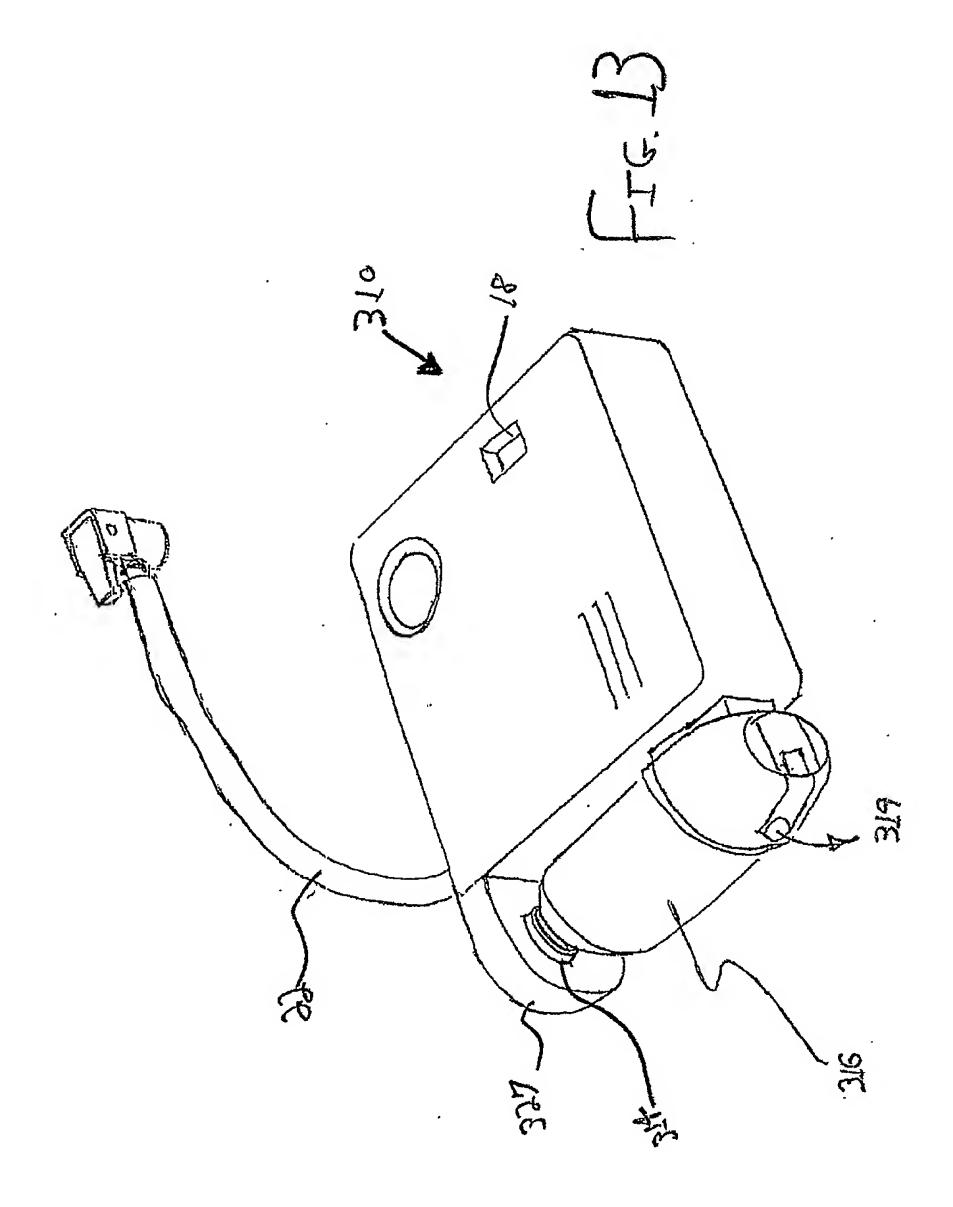
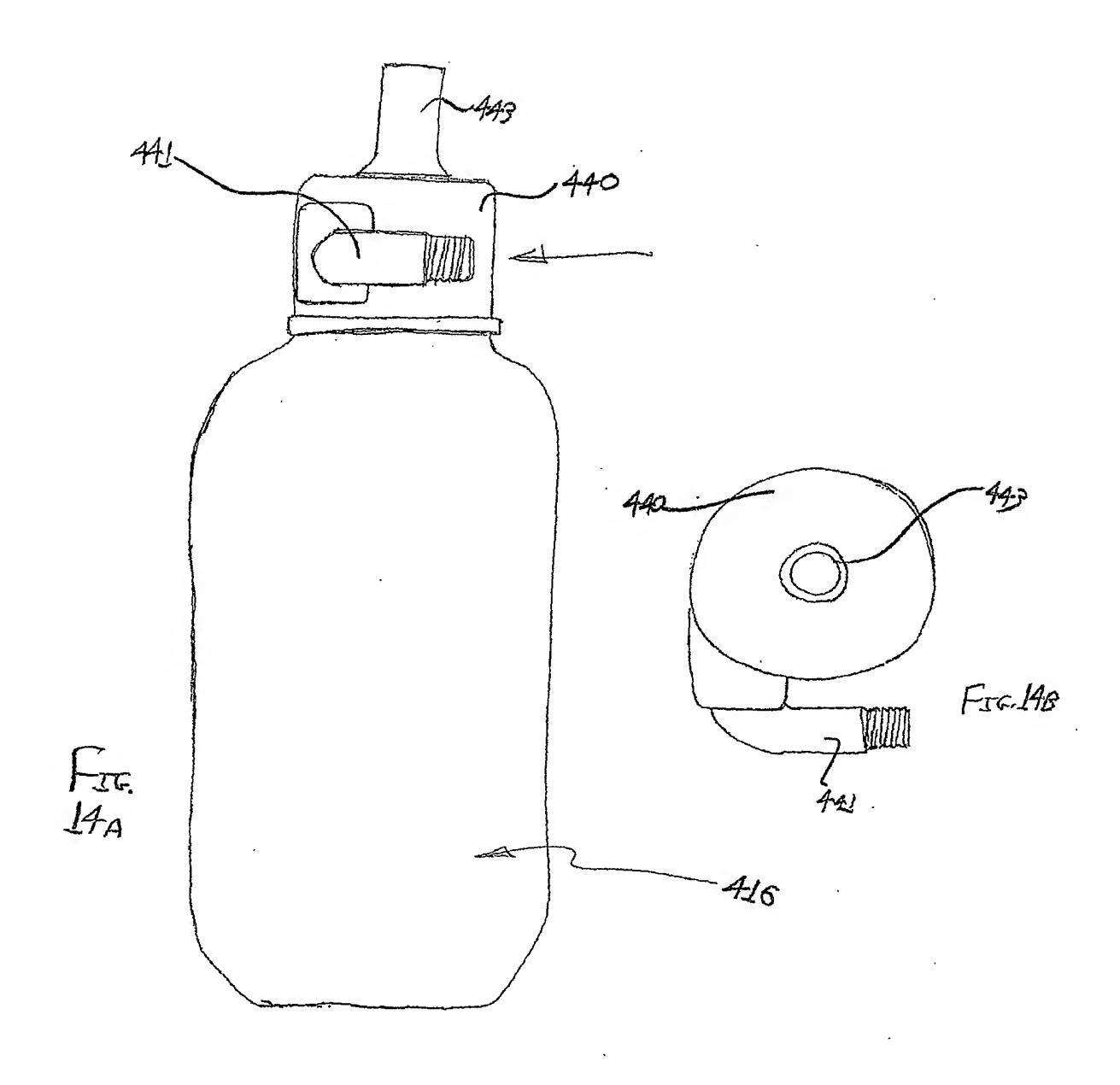


FIG. 10









#### INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/33167

A. CLA	SSIFICATION OF SUBJECT MATTER				
IPC(7) : B65B 31/00					
US CL : 141/38,98					
According to	International Patent Classification (IPC) or to both na	ational classification and IPC			
B. FIEL	DS SEARCHED				
Minimum do	ocumentation searched (classification system followed	by election symbols)			
Minimum documentation searched (classification system followed by classification symbols) U.S.: 141/38,98,67					
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Documentati	on searched other than minimum documentation to the	extent that such documents are included i	n the fields searched		
NONE					
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C. DOC	UMENTS CONSIDERED TO BE RELEVANT				
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Further	documents are listed in the continuation of Box C.	See patent family annex.			
Special categories of cited documents:		"T" later document published after the inte	rnational filing date or priority		
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	il Stop PCT, Attn: ISA/US mmissioner for Patents	Steven O. Douglas			
	D. Box 1450				
Ale	Alexandria, Virginia 22313-1450 Telephone No. 703-308-0861				
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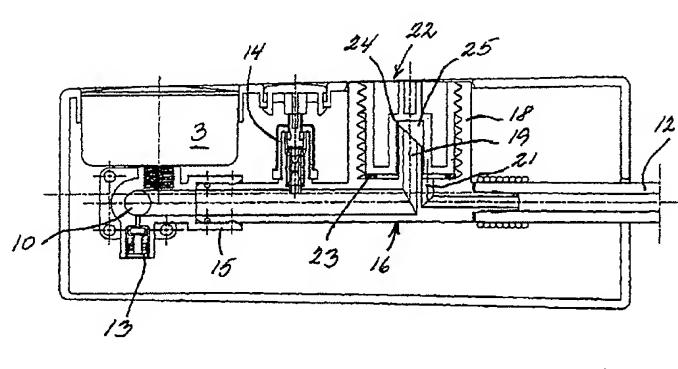
- (71) Applicant (for all designated States except US): ACTIVE TOOLS A/S [DK/DK]; Rohdenvej 4, Rohden, DK-7140 Stouby (DK).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): LÆTGAARD,

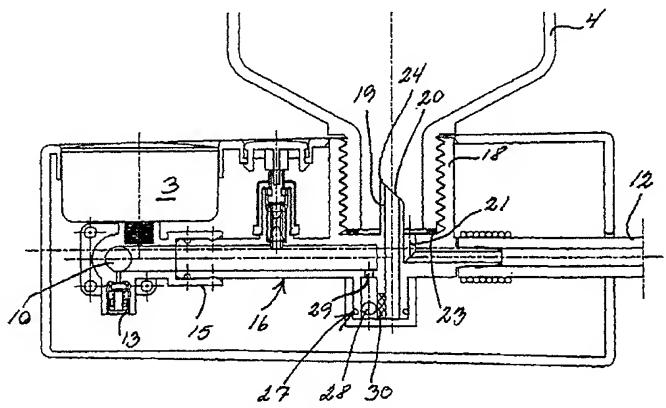
Thomas [DK/DK]; Banevænget 2B, DK-8700 Horsens (DK).

- (74) Agent: PATRADE A/S; Fredens Torv 3A, DK-8000 Århus C (DK).
- (81) Designated States (national): AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK (utility model), SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR,

[Continued on next page]

(54) Title: INFLATING UNIT WITH SEALING FACILITIES FOR A TYRE FILLED WITH AIR





A compact combination (57) Abstract: apparatus for inflating and mending a car tyre comprises a compressor with an outlet (10), where compressed air is lead to a tube (12) for connection to the filling valve of the tyre. In the duct of compressed air, an elbow pipe connector is provided (19), which can break the sealing on a bottle (4) with a sealing material and lead compressed air into the bottle, and by that pressing the sealing material out into the tube (12) through a pipe opening (21) at the end of the opening of the bottle. When the inflating unit is used only for refilling a tyre with air without mending it, a plug is inserted (22) in the socket (18) where the bottle (4) is to be fitted that, thus preventing admission of compressed air to the environment and instead conducting compressed air to the tube (12) through a clearance between a cavity (25) in the plug (22) and the pipe connector (19). According to the invention, a permanently mounted container with sealing material is avoided during normal use where tyres have to be refilled with air, whereby a substantial amount of space is saved.

WO 03/004328 A1



GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

#### Published:

— with international search report

#### Inflating unit with sealing facilities for a tyre filled with air

#### Background of the invention

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The present invention relates to a compact inflating unit with sealing facilities for a tyre filled with air including a source of compressed air, for example an electrically driven compressed air compressor, where a duct for compressed air connects the source of compressed air with a filling connector, which can engage the filling valve of the tyre, as a selector device is inserted between the source of compressed air and the filling connector, where the selector device either can lead the compressed air directly from the source of compressed air to the filling connector or can leads the compressed air through a container with a sealing agent to the filling connector.

Such an apparatus is described in US 4 765 367 and can be used to both refilling air into a car tyre and to mend a tyre puncture. The apparatus is a compact type that can either be carried as an accessory in a car, or mounted in the car without occupying much space.

The container with sealing material is provided separately and is connected to a selector device, which consists of a valve arrangement. The valve has two positions, one of which compressed air is led to and though the container in order to conduct sealing material to the filling connector and thereby to the tyre, and another position where compressed air is led directly to the filling connector.

It is obvious that in practice the refilling function is by far the most used and it is rare that the function for mending a puncture is used. Nevertheless, the container with the sealing material, which constitutes a large part of the whole apparatus, must be carried all the time, among others because the encasing of the container in the apparatus prevents removal of the container.

#### Object of the invention

It is a main object with the invention to provide an inflating unit, where it is not necessary to carry the container with the sealing material all the time.

#### Summary of the invention

This is achieved with an inflation unit of the kind mentioned in the introduction, where the selector device is arranged for alternative fastening of the container or an insert, where the insert is attached to the selector device instead of the container with the sealing agent when delivering compressed air directly from the source of compressed air to the tyre, and where the insert is adapted so that it can lead compressed air directly from the source of compressed air to the filling connector.

When the unit is usen for inflating, the insert is placed in the selector device, and inflating may be effected. When mending a puncture is needed, the insert is substuted with the container containing sealing agent, and mending may be performed. When not in use, the container can be stored somewhere and apart from the inflating unit, so that it is not needed to carried with the unit.

In a preferred embodiment of the invention, the container is provided with a neck, which can engage a socket in the inflating unit, for example by a screw connection, and where the socket comprises a perforation member for breaking a sealing in the neck of the container, where the perforation member consists of a sharp edged pipe connector provided as a part of the duct of compressed air and protruding into the socket, and where the insert has a recess or cavity for accommodating the pipe connector and simultaneously allowing air to pass from the pipe connector to a downstream section of the air duct. When using the mending function, the container is just mounted in the socket, whereby the sealing is broken, and by introducing compressed air, the sealing material is forced out of the container.

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To avoid sealing material to be driven in the direction of the source of compressed air because of a static pressure downstream of the container, it is preferred that in connection with, and downstream of the pipe connector, a check valve is provided for preventing flow from the pipe connector and in the direction of the source of compressed air.

#### Brief description of the drawings

Embodiments of the invention are described in detail below with reference to the drawings, where:

- 5 Fig. 1 shows a front view of an inflating unit according to the invention,
  - Fig. 2 shows an inflating unit according to Fig. 1, but where the upper cover is removed,
  - Fig. 3 shows a section on the line III-III in Fig. 1 in a first embodiment of the inflating unit according to the invention, and
- Fig. 4 shows the same section as Fig. 3, but of a second embodiment of the inflating unit according to the invention, and where a bottle with sealing material is mounted instead of a plug in the unit

#### Detailed description of embodiments

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As shown on the drawings, according to the invention the inflating unit can be arranged in a rectangular and relatively flat box or cabinet 1, which on its front is provided with an electronic switch 2 and a manometer 3 which all the time detects the excess pressure in the duct of compressed air of the apparatus and the connected parts. With the number 4 the outline of a container with sealing material is indicated, which can be a latex suspension or an other known sealing agent. In this case, the container 4 is provided in the shape of a bottle made of synthetic materials. Of course other geometries and materials can be used for the container 4. The unit, as shown on Fig. 2, comprises an electric motor 5 with an output shaft 6, which by a crankshaft 7 operates a compressor piston 8. In this case, the motor 5 is a DC motor for 12 volt which without further ado can be connected to a plug for a cigarette lighter in a car, for example with a plug 9 on Fig. 2 connected with a not shown wire.

The compressed air compressor is constructed in a known manner, as the inlet valve is built into the piston 8 and the outlet valve in outlet 10 from the compressor. Thus outlet 10 forms the first section of the duct of compressed air, which extends from outlet 10 and forward to a tube 12 which, in a not shown way, is provided with a connector for connection to a valve on a tyre.

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The apparatus is provided with a safety valve 13 and an air-escape valve 14

At the outlet 10 from the compressor, the compressed air duct is formed as an elbow pipe, which ends in a sleeve 15. Between sleeve 15 and tube 12 there is a intermediate piece 16, 16' constituting the essential part of the invention. The intermediate piece 16 is attached to the unit with two screws 17, see Fig. 2. In this embodiment of the invention the intermediate piece 16, 16' is provided with a connection 18 for the container 4 in the form of a screw socket 18. At the centre of the socket 18, a pipe connector 19 protrudes, provided with a slanting cut 20 and a sharp upper edge 24. The pipe connector 19 is part of the duct of compressed air and communicates with the outlet 10. Next to the pipe connector 19 the duct of compressed air continues at the bottom of the socket 18, here shown by the number 21.

When the inflating unit according to the invention is used for refilling a tyre, an insert or plug 22 is inserted into the socket 18. The plug 22 has an airtight abutment against the bottom of the socket 18 by means of a sealing ring 23. It can be seen on Fig. 3 that the plug in that way completely closes the admission of compressed air to the environment. The compressed air, which flows from the duct, passes into a cavity 25 in the plug 22, from where the air passes between the inner walls of the cavity 25 and the outer walls of the connector pipe 19 down to the continuation of the compressed air duct 21.

When the unit is used for mending a tyre, the plug 22 is unscrewed, and a bottle 4 with sealing material is screwed on, as the sharp upper edge 24 of connector 19 cuts though the film sealing which initially covers the opening of the bottle 4. In the same way as the plug 22, the opening of the bottle 4 is sealed with a sealing ring 23 in relation to the bottle of the socket 18. By activating the compressor, compressed air is lead into the bottle 4 and the sealing material is pressed out through the duct piece 21 and out into the tube 12.

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It is preferred to arrange the unit as shown on Fig. 4 with a intermediate piece 16' where a check valve 27 is disposed between the pipe connector 19 and the up-stream sections of the duct of compressed air. In its simplest embodiment, as shown on Fig. 4

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the check valve consists of a ball 28, which in a closed position can fit into a small hole 29, while in an open position it is pressed up against a mesh 30, where air can pass around the ball 28 and into the pipe connector 19. Thereby it is avoided that a static pressure in the tube 12 and bottle 4 causes the sealing material to flow back towards the outlet 10 of the compressor.

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The indicated use of a intermediate piece 16, 16' allows for separating the parts in order to clean the intermediate piece and adjoining parts for sealing material after having used the mending function.

PCT/DK02/00441

#### **CLAIMS**

1. Inflating unit with sealing facilities for a tyre filled with air including a source of compressed air, where a duct for compressed air connects the source of compressed air with a filling connector, which can engage the filling valve of the tyre, as a selector device is inserted between the source of compressed air and the filling connector, where the selector device either can lead the compressed air directly from the source of compressed air to the filling connector or can leads the compressed air through a container with a sealing agent to the filling connector, **c h a r a c t e r i z e d** in that the selector device is arranged for alternative fastening of the container or an insert, where the insert is attached to the selector device instead of the container with the sealing agent when delivering compressed air directly from the source of compressed air to the tyre, and where the insert is adapted so that it can lead compressed air directly from the source of compressed air to the filling connector.

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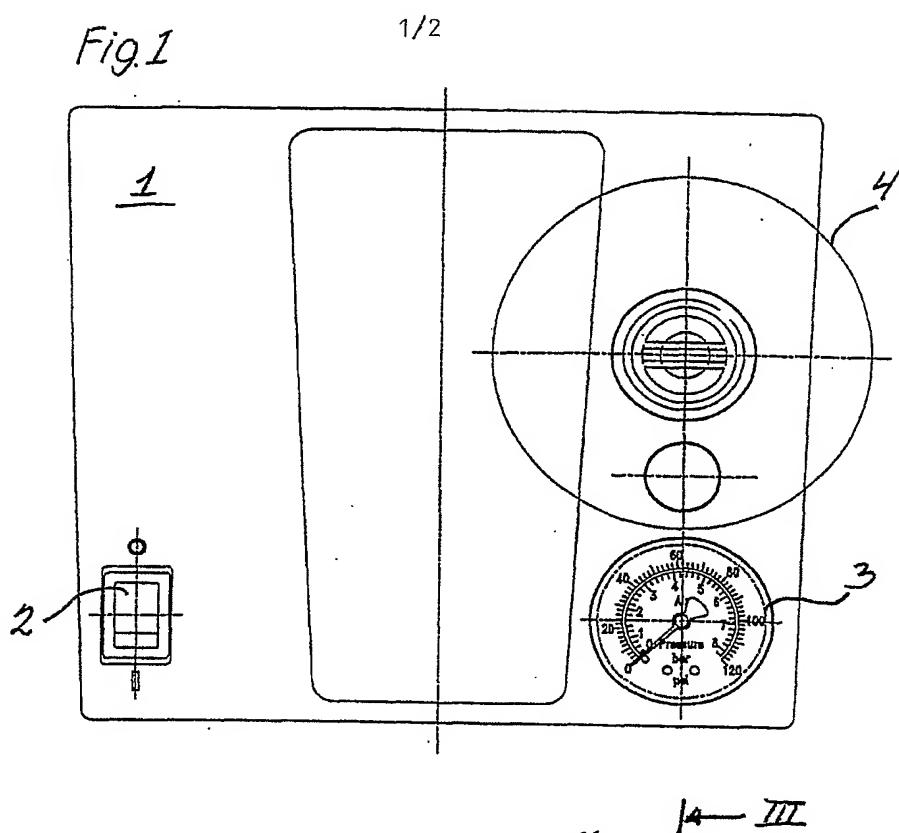
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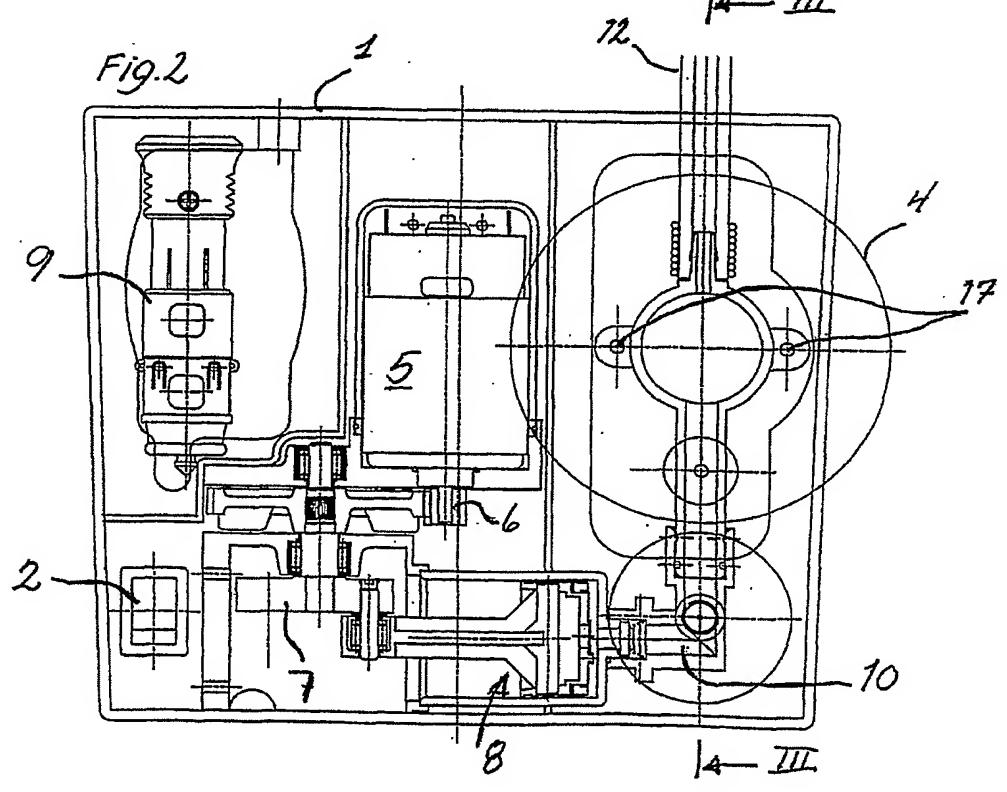
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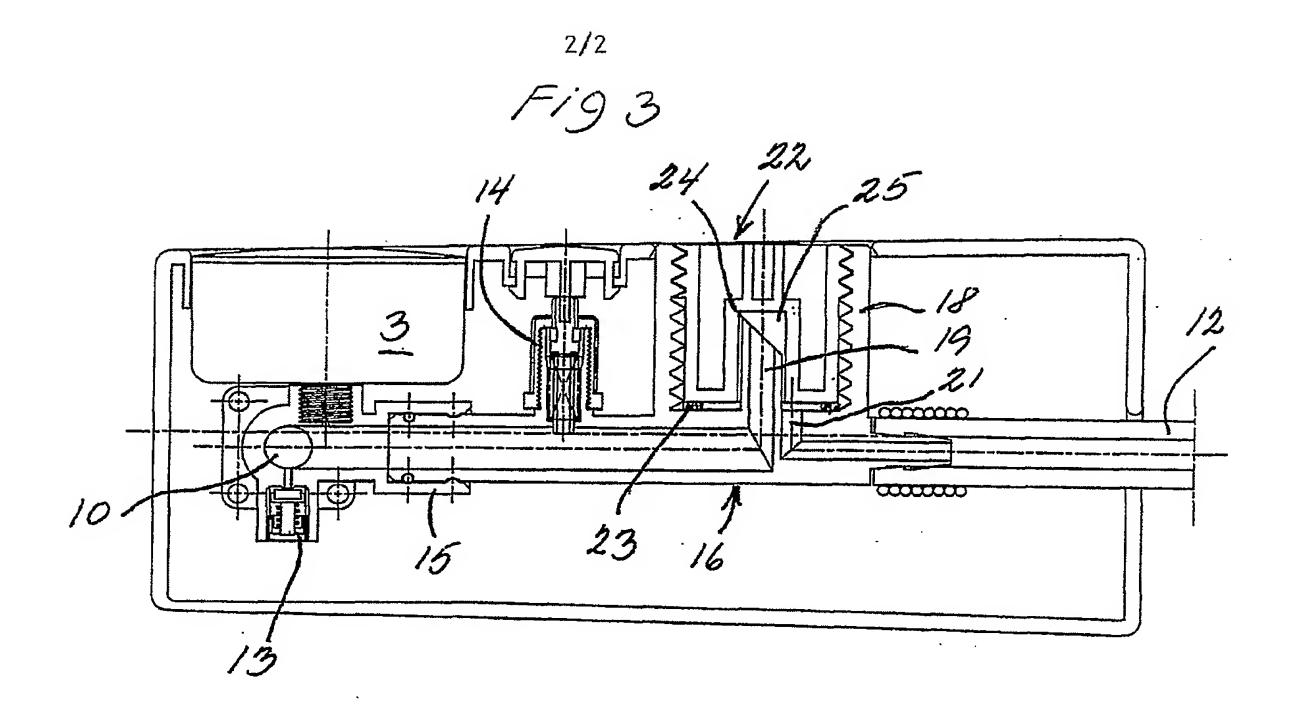
2. Inflating unit according to claim 1, where the container is provided with a neck, which can engage a socket in the inflating unit, for example by a screw connection, and where the socket comprises a perforation member for breaking a sealing in the neck of the container, **c h a r a c t e r i z e d** in that the perforation member consists of a sharp edged pipe connector provided as a part of the duct of compressed air and protruding into the socket, and where the insert has a recess or cavity for accommodating the pipe connector and simultaneously allowing air to pass from the pipe connector to a downstream section of the air duct.

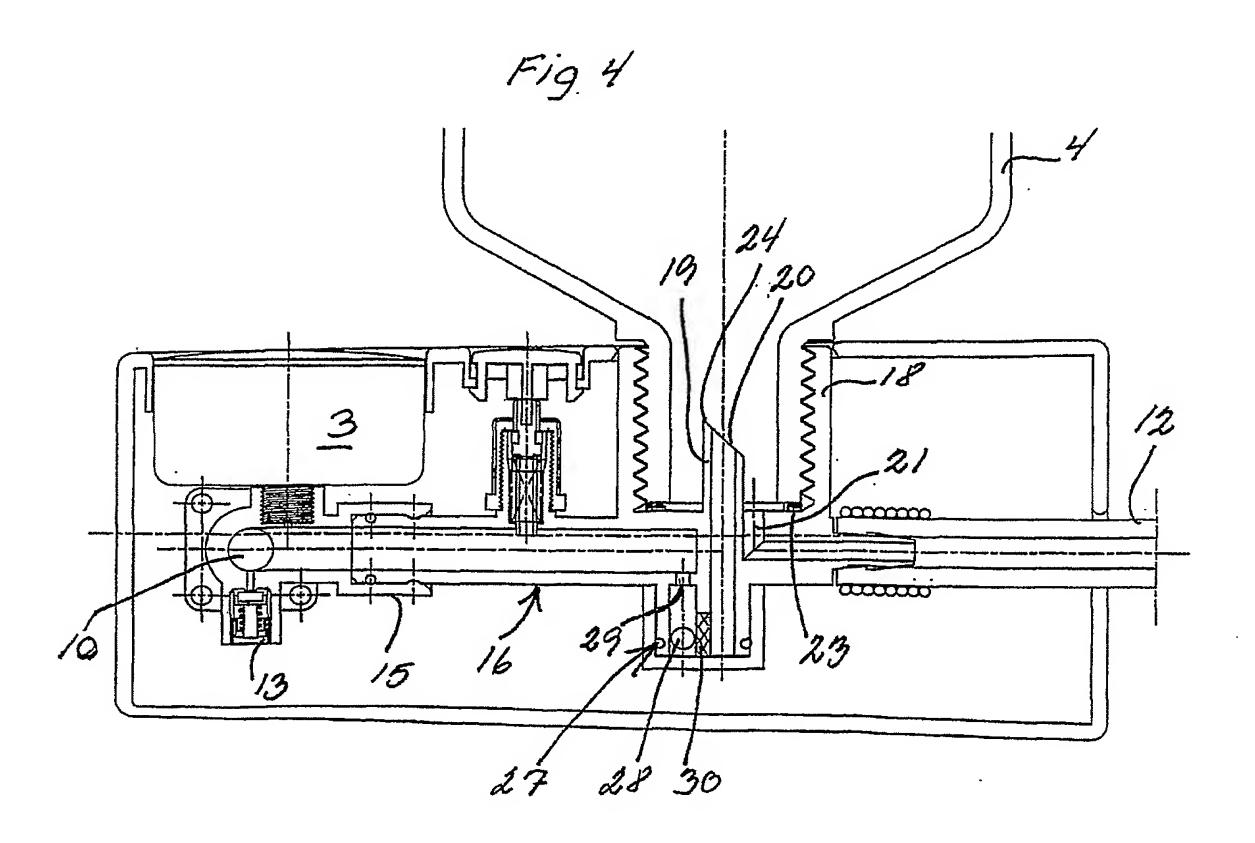
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3. Inflating unit according to claim 2, c h a r a c t e r i z e d in that in connection with, and downstream of the pipe connector, a check valve is provided for preventing flow from the pipe connector and in the direction of the source of compressed air.









#### INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 02/00441

#### A. CLASSIFICATION OF SUBJECT MATTER IPC7: B60S 5/04, B29C 73/16 According to International Patent Classification (IPC) or to both national classification and IPC B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC7: B60S, B29C Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched SE,DK,FI,NO classes as above Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-INTERNAL, WPI DATA, PAJ C. DOCUMENTS CONSIDERED TO BE RELEVANT Relevant to claim No. Citation of document, with indication, where appropriate, of the relevant passages Category\* FR 2753653 A1 (CITRON MICHEL ET AL), 27 March 1998 1 A (27.03.98)US 4765367 A (MARK E. SCOTT), 23 August 1988 A (23.08.88)DE 19846451 A1 (SUMITOMO RUBBER INDUSTRIES LTD.), 1-3 A 13 April 2000 (13.04.00) EP 0753420 A2 (SP REIFENWERKE GMBH), A 15 January 1997 (15.01.97) Further documents are listed in the continuation of Box C. See patent family annex. later document published after the international filing date or priority Special categories of cited documents: date and not in conflict with the application but cited to understand document defining the general state of the art which is not considered the principle or theory underlying the invention to be of particular relevance earlier application or patent but published on or after the international document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive filing date step when the document is taken alone document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other document of particular relevance: the claimed invention cannot be special reason (as specified) considered to involve an inventive step when the document is combined with one or more other such documents, such combination document referring to an oral disclosure, use, exhibition or other "O" being obvious to a person skilled in the art document published prior to the international filing date but later than "&" document member of the same patent family the priority date claimed Date of mailing of the international search report Date of the actual completion of the international search 0 7 -10-2002 4 October 2002 Name and mailing address of the ISA/ Authorized officer Swedish Patent Office Hans Nordström/MP Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86 Telephone No. +46 8 782 25 00

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#### INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 02/00441

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02/09/02

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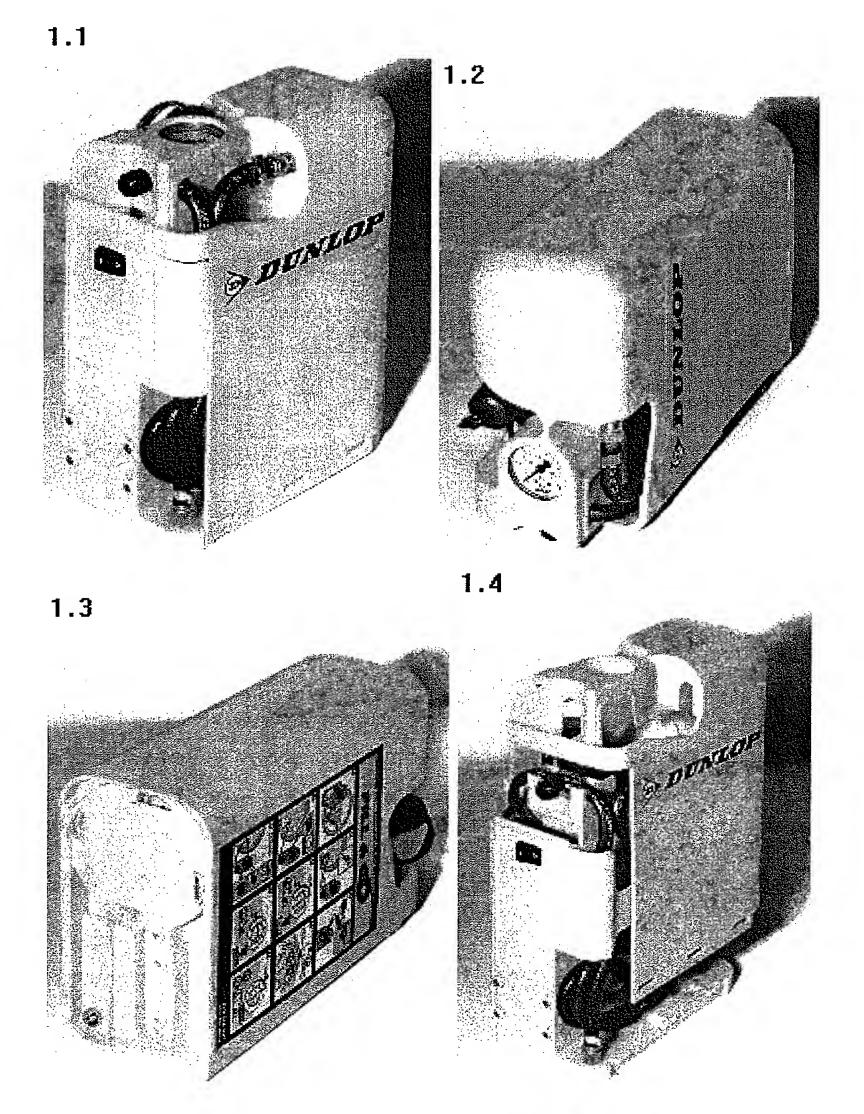
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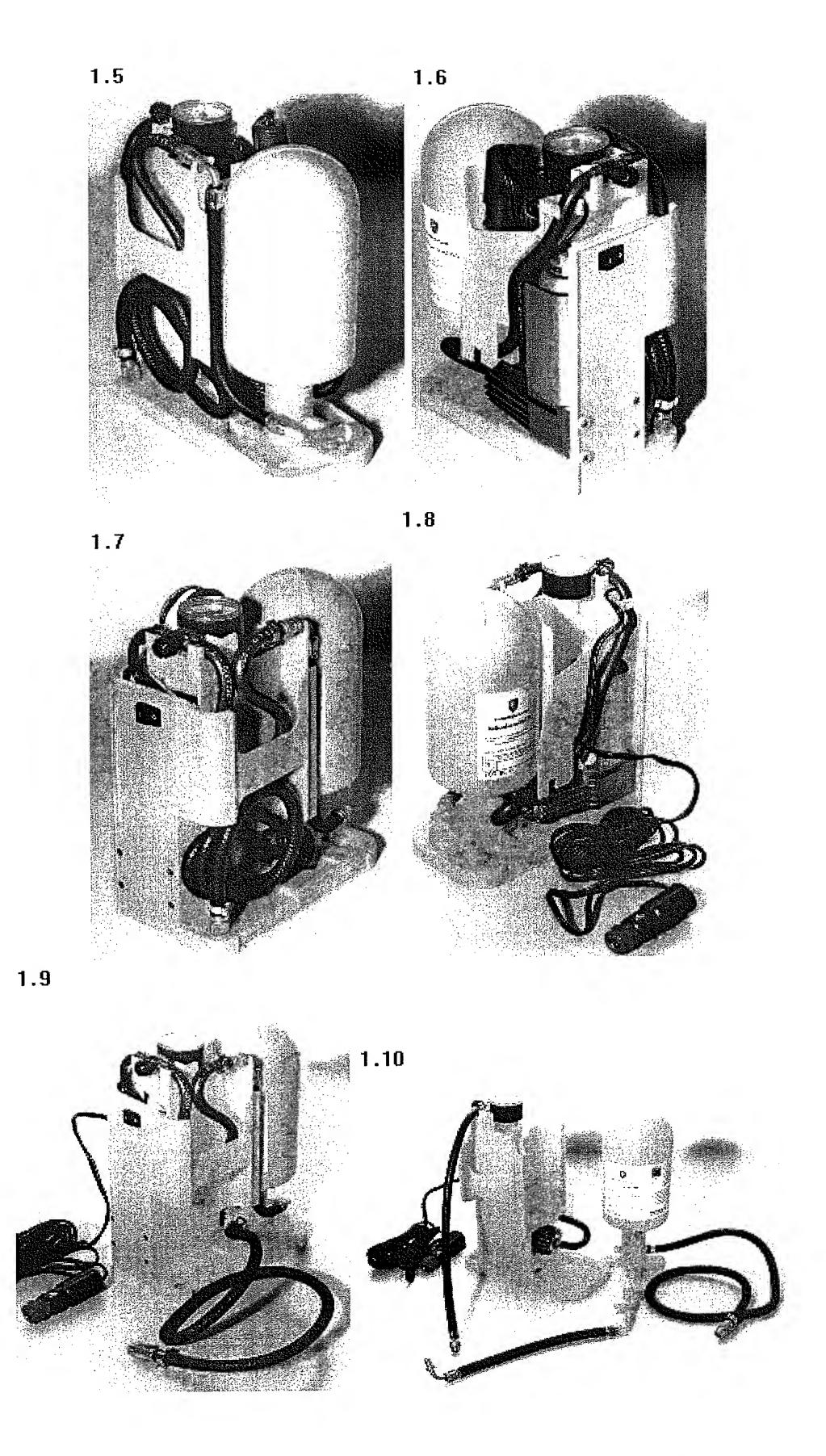
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- (71) Applicant (for all designated States except US): ACTIVE TOOLS A/S [DK/DK]; Møllerupvej 24, DK-8410 Rønde (DK).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): ERIKSEN, Mandsfelt, Steen [DK/DK]; Larsensvej 10, DK-3230 Græsted (DK). LÆTGAARD, Thomas [DK/DK]; Banevænget 2B, DK-8700 Horsens (DK). GAMBORG, Stig [DK/DK]; Rohdenvej 4, Rohden, DK-Stouby 7140 (DK).
- (74) Agent: HOLME PATENT A/S; Vesterbrogade 20, DK-1620 Copenhagen V (DK).

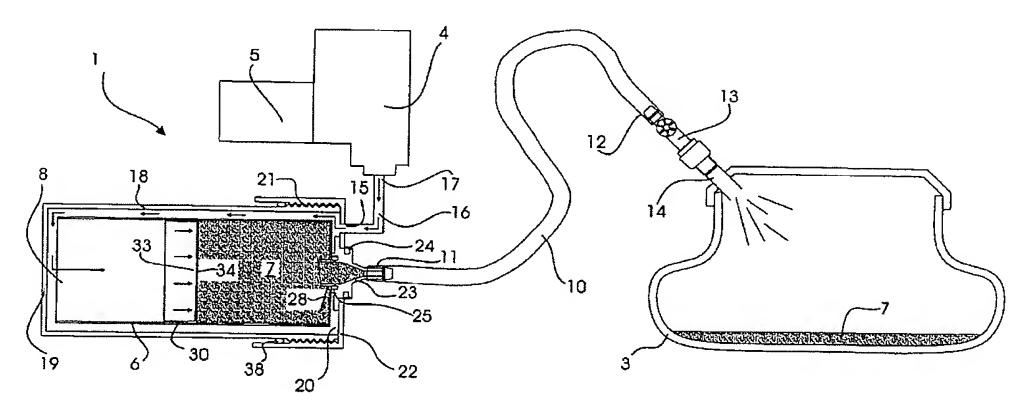
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(54) Title: A DEVICE FOR SEALING AND INFLATING AN INFLATABLE OBJECT



(57) Abstract: A device (1) for inflating a tire (2) having gone flat to a wanted pressure and for sealing and inflating a puncture tire (3). The device comprises a compressed-air source (4), a tubular container (6) filled with a sealing agent (7), and a first conduit (10) having an adapter (13) at its second end (12) for connecting the conduit (10) to a valve (14) on the tire (2;3). The container (6) furthermore has an inlet opening (8) for passage of compressed air from the compressed-air source (4) and an outlet opening (9) for passage of sealing agent (7). The container (6) is enclosed by a tubular cylinder (18) having at one end an aperture (20) closed by a cover (22). The cover is mounted displaceable on the cylinder (18) between a first operative position and a second operative position. Thereby, it is obtained that the device is quick and easy to operate. Sealing and inflating of a puncture tire are done in between one and three minutes. Packed up, the device takes up practically no space whereby the heavy and bulky spare wheel is made unnecessary. Thereby, the space and load capacity previously occupied by the spare wheel is utilised.

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### A device for sealing and inflating an inflatable object

The invention relates to a device for inflating a tire having gone flat to a wanted pressure and for sealing and inflating a punctured tire and of the kind comprising a compressed-air source; a tubular container filled with a sealing agent and having an inlet opening for passage of compressed air from the compressed-air source and an outlet opening for passage of sealing agent; a first conduit connected to a first area on the device at a first end and having an adapter at the second end for detachably connecting the first conduit to a valve on the tire; and a second conduit connected to a second area on the device at a first end and to the compressed-air source at the second end.

Tires on vehicles such as cars, motorcycles and ordinary bicycles are in danger of, especially during driving, puncturing if the vehicle runs over sharp objects on the road.

If a tire on a bicycle punctures, the unpleasant situation might arise that the cyclist cannot or only can continue with difficulty because it is not possible to mend the punctured tire on the spot.

To avoid getting in the same serious situation, cars are therefore usually provided with a spare wheel for replacing a punctured wheel. However, many drivers are not able to make such a change of wheel themselves and others find the job difficult and unpleasant.

The spare wheel also poses a considerable problem in itself as the spare wheel reduces the net load of the car and occupies otherwise usable space.

With a view to eliminate the above problems, devices have therefore been developed over the years for being able to mend a punctured tire on the spot in an easy and manageable manner.

The main components of these devices are a compressed-air source and a container containing a sealing agent.

Such an integrated device is known from DE 2297 16 453 U1 which has a flexible container located in a pressure chamber which can be pressurized by a compressor upon use. The device has a first breaking point above the container and a second breaking point in a direct connection between the compressor and the tire, which is to be sealed and inflated.

A disadvantage of the described known technique is that its application is limited to the ability of the two breaking points to resist a certain load. The known device is therefore not universally applicable.

One aspect according to the invention is to provide a device of the kind mentioned in the opening paragraph, which can be used quickly and easily to inflate a tire having gone flat to a wanted pressure and that furthermore is able to quickly and easily seal and inflate a punctured tire as well.

A second aspect according to the invention is to provide a device of the kind mentioned in the opening paragraph, which has a simple and inexpensive structure.

A third aspect according to the invention is to provide a device of the kind mentioned in the opening paragraph, which has a compact design and a very small volume.

The device according to the invention comprises that the container containing the sealing agent is enclosed by a tubular cylinder connected to the first end of the second

conduit and having a fixed bottom at one end and an opening at the other end, said opening closed by a cover connected to the first end of the first conduit and mounted movably on the cylinder between a first operative position in which the first conduit is communicating with the interior of the cylinder and a second operative position in which the first conduit is communicating with the outlet opening of the container.

Normally, the device is lying ready for use in e.g. the boot of a car with the cover located in its first operative position and the sealing agent sealed in the container.

In this state, the device can readily be used for quickly and easily inflating a tire having gone flat to a wanted pressure, which possibly can be indicated, on a manometer fitted on the device. The adapter of the first conduit merely has to be connected to the valve of the tire and the pressure source which typically can be a compressor driven by an electric motor.

If the electric motor is connected to a power source, for example cigarette lighter in a car, the compressor will generate compressed air which, via the first conduit, will flow into the tire which thereby is inflated. When the wanted pressure has been reached, the power is cut from the motor and the adapter of the first conduit removed from the valve of the tire. The device is now ready to be used again as pump and the sealing agent in the container is still intact.

If the device is to be used for sealing and inflating a punctured tire, the adapter of the first conduit is also connected to the valve of the tire, whereas the cover is displaced to its second operative position whereby the first conduit is made to communicate with the outlet opening of the container. When the compressed-air source then is activated, the compressed air will force the sealing agent into the tire

via the first conduit and after the container has been emptied of sealing agent, the compressed air will continue to flow into the tire via the first conduit.

As it can be seen, a punctured tire on a car is sealed and inflated in this way quickly, effectively and easily so that the car can be relieved of the load of having to drive around with a spare wheel whereby expenses to gas are saved in the long run. At the same time, the driver is freed from the difficult, unpleasant job of having to change a tire if occasion should arise. By means of a device according to the invention a punctured tire can be mended in less than a minute that is in far shorter time than it takes to change a punctured tire for a spare wheel.

In a preferred embodiment of the device according to the invention, the outlet opening of the container is sealed by means of a first seal. Behind the sealing agent in the container, a plunger is located displaceable from a bottom position at the inlet opening to a top position at the outlet opening, and an aperture, sealed by means of a second seal, is made in the plunger. Furthermore, the cover is provided with a needle connected to the first end of the first conduit.

In one embodiment, the first and/or second seal can be a breakable membrane made in one piece with the edge of the respective aperture. This embodiment is especially expedient if the container and the plunger are cast of for example plastic as the seal then is formed automatically during the casting process itself.

In a second embodiment, the first and/or second seal can however be designed as a slab detachably mounted in the respective aperture. In this solution the slabs are mounted in the respective apertures with a suitable force fit. At use the slab or slabs are then pushed out of the associate aperture

easily and for certain by means of the needle which does not have to be provided with a cutting edge for this purpose but best can be blunt.

In the first operative position of the cover, the needle is located at a distance from the first seal. In this state, the device can immediately be used for inflating a tire having gone flat to a wanted pressure. The sealing agent is kept securely sealed in the container during this by means of the first seal over its outlet opening.

But if the cover is displaced from its first to its second operative position, the needle will penetrate the first seal whereby the interior of the latex-filled container is connected to the needle. When the compressed-air source then is activated, compressed air is generated which will displace the plunger in direction towards its top position whereby the plunger will press the sealing agent in the container into the tire via the first conduit.

In the top position of the container, the needle will also penetrate the second seal which is sealing the aperture of the plunger. At this point, the container has been emptied of sealing agent whereby the compressed air is allowed to flow freely into the tire and inflate this tire to a wanted pressure.

In an expedient embodiment, the cylinder and the tire can be interconnected by means of a threaded joint. In this case, the cover is displaced from its first and second operative positions merely by manually rotating the two parts in relation to each other. For example, the cylinder can be the rotatable part whereas the cover is fixed.

The outlet opening of the container can advantageously be arranged in a branch piece on a bottom designed on the

container, and both this branch piece and the needle can furthermore be designed with barbs engaging each other when the device is in its second operative position.

If the needle furthermore is detachably mounted in an aperture made in the cover and sufficiently large to allow the first conduit and its adapter to pass, the empty container, needle and conduit with its adapter can be pulled completely free of the cover and thereby the device, the needle and the branch piece of the container being hooked together by means of their barbs. After sealing and inflation of a punctured tire, these parts will be useless as they are now clogged by hardened sealing agent and therefore must be replaced.

An expedient piping is obtained if the first end of the second conduit is connected to the cover, and a gap is located between the container and the cylinder, through which gap the second conduit can communicate with the inlet opening of the container.

During a sealing and inflating operation, the operator can advantageously follow the process if the cylinder and the container are made of a transparent material whereas the plunger and/or sealing agent have a distinct, dark colour, as the operator then can see how the container is successively emptied of sealing agent.

For practical reasons, the different components of the device can be collected in a box. If the box is designed with a window or opening, the operator will be able to follow the process even if the cylinder and the container are still in the box.

Via the same window or a different window, the operator is also made able to displace the cover from one operative position to the other. If the cylinder and cover are

interconnected by means of a threaded joint, said displacement takes place merely by manually rotating e.g. the cylinder in relation to the cover.

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The invention will be explained in greater details below, describing only exemplary embodiments and giving further advantageous characteristics and technical effects of the device according to the invention with reference to the drawing, in which

- Fig. 1 is a diagrammatic axial-sectional view of a device in a process step in which a tire having gone flat is inflated to a wanted pressure,
- Fig. 2 is the device in fig. 1 but in a first process step during sealing and inflating of a punctured tire,
- Fig. 3 is the device in fig. 1 but in a second process step,
- Fig. 4 is the device in fig. 1 but in a third process step,
- Fig. 5 shows the device after conclusion of the process in figs. 2-4,
- Fig. 6 shows the disassembly of the device for replacement of parts having been clogged by hardened residues of sealing agent,
- Fig. 7 is on a larger scale a detail of the device,
- Fig. 8 is a perspective front view of a box in which the device can be placed, and
- Fig. 9 is a perspective bottom view of the box in fig. 8,

Fig. 10 is on a larger scale a fractional view of the device in figs. 1 - 9 with a first embodiment of a seal in sealed state,

Fig. 11 is on a larger scale a fractional view of the device in figs. 1 - 9 with a second embodiment of a seal in sealed state, and

Fig. 12 shows the seal in fig. 11 in opened state.

In the following it is assumed that the device 1 according to the invention is to be used for inflating a car tire 2 having gone flat or alternatively for sealing and inflating a punctured tire 3 and that the sealing agent is latex 7.

The figure shows a device 1 according to the invention that comprises a compressor 4 driven by a motor 5 during operation, and a tubular container 6 filled with latex 7 and having and inlet opening 8 for passage of compressed air from the compressor 4 and an outlet opening 9 for passage of latex 7 or air.

A first conduit 10 is connected to the device 1 at a first end 11 whereas the second end 12 is provided with an adapter 13 for detachably connecting the first conduit 10 to a valve 14 on the cover 2.

Furthermore, the device 1 is connected to a first end 15 of the second conduit 16 which is connected to the compressor 4 at its second end 17.

The container 6 is enclosed by a tubular cylinder 18 having a fixed bottom 19 at one end and an aperture 20 at the other end, said aperture being closed by a cover 22 by means of a threaded joint 21, the cover being connected to both the first

end 11 of the first conduit 10 and the first end 15 of the second conduit 16.

To be more explicit, the first end 11 of the first conduit 10 is connected to a needle 23 mounted on the cover 22 by means of a number of locking tabs 24. The exterior of the needle 23 is designed with a number of barbs 25.

The container has a second bottom 26 with a branch piece 27 defining the outlet opening 9 of the container, said opening being closed by a first seal 28 in the initial position of the device. The exterior of the branch piece 27 is designed with a number of barbs 29 corresponding to the barbs 25 of the needle.

In the container 6, a plunger 30 is furthermore located that can be displaced from a bottom position 31 at the inlet opening 8 to a top position 32 at the outlet opening 9. In the plunger 30, an aperture 33 is designed and is sealed by a second seal 34.

By means of the threaded joint 21, the cover 22 can be turned back and forth between the first operative position in fig. 1 and the second operative position in figs. 2-5.

In the first operative position of the cover, the needle 23 is located, as shown in fig. 1, at a distance from the first seal 28. In this state, the device can immediately be used for inflating a tire 2 having gone flat to a wanted pressure in the following way.

The adapter 13 of the first conduit 10 is connected to the valve 14 and the motor 5 is connected to e.g. the cigarette lighter in a car (not shown) whereby the compressor 4 is made to generate compressed air which will flow into the tire 22 via the second conduit 16.

As the needle 23 in the first operative position of the cover 22 is located at a distance from the first seal 28, the air flow is allowed to flow via the thus formed gap 35 further out into the needle 23 and from here into the tire 2 via the first conduit 10, the adapter 13 and the valve 14.

The device 1 can possibly be provided with a manometer (not shown) for continuously showing the current pressure in the tire 2 during the inflating operation. When the tire 2 has been inflated to the wanted pressure, the power is cut to the motor 5 and the adapter 13 of the first conduit 10 is removed from the valve 14 after which the device 1 is packed up to be stored for later use in e.g. the boot of the car. As can be seen, the latex 7 in the container 6 is still fully intact and can therefore be used for sealing a punctured tire 3.

When the device 1 is to be used for sealing and inflating a punctured tire 3, the first conduit 10 is connected to the valve 14 of the tire 3 in the same way as described above, and the cover 22 is turned manually to its second position whereby the needle 23 will open the first seal 28 over the outlet opening 7 of the container 6, as shown in figs. 2 - 5, and the barbs 25 of the needle 23 will engage the barbs 29 of the branch piece 27.

Then, the motor 5 and the compressor 4 are activated which thereby will generate compressed air that will flow, as indicated by the arrows, into the cover 22 via the second conduit 16 and from there in under the plunger 30 via a gap 35 located between the cylinder 18 and the container 6. In this phase, the plunger is located in its bottom position 31 near the inlet opening 8 of the container 6, as shown in fig. 2.

As shown in fig. 3, the plunger 30 will now begin to, under the influence of the generated compressed air, travel in the direction of the arrow towards the needle 23 whereby the plunger 30 will force the latex 7 out into the tire 3 via the needle 23, the first conduit 10, the adapter 13 and the valve 14.

In fig. 4, the plunger 30 has reached its top position 32 whereby the second seal 34 over the aperture 33 of the plunger 30 has been opened by the needle 23. The compressed air from the now emptied container 6 will then flow into the tire 3 via the now free passage in the plunger 30, the also free passage of the container 6, the needle 23, the first conduit 10, the adapter 13 and the valve 14 of the tire 3.

During this, the tire 3 is inflated to the wanted pressure and when this pressure has been reached, the adapter 13 is removed from the valve 14 of the tire after which the car is driven a few kilometres to distribute the latex 7 well in the tire 3 and thereby ensure that the latex 7 will reach the puncture.

When the device 1 has been used for sealing and inflating a punctured tire 3, more or less hardened latex 7 will remain in the container 6 and the first conduit 10. Therefore, it will be necessary to replace these components.

The container 6 is therefore pulled out of the device 1 as shown in fig. 6. During this, the first conduit 10 which is connected to the needle 23 will follow as the needle 23 and the branch piece of 27 the container 6 are hooked together by their respective barbs 25;29, and the first conduit 10 is detachably mounted in the cover 22 in an aperture 36 sufficiently large to allow the adapter to pass.

If the old container 6 with the first conduit 10 is removed, a new, full container with an associate first conduit can be mounted in the device 1.

Fig. 7 is on a larger scale a segment of the device 1 in figs. 2 - 5 with the cover 22 in its second operative position. As shown in the figure, the barbs 29 of the branch piece 27 are hooked to the barbs 25 of the needle 23.

Between the needle 23 and the cover 22, a first gasket 37, for example an O-ring, is provided for ensuring airtight joining between the cover 22 and the needle 23 when the compressor is pumping air into the tire 3.

Between the cover 22 and the cylinder 18, a second gasket 38 is provided for the same reasons.

As shown in figs. 8 and 9, the device is advantageously assembled as an integrated unit in a cassette or box 39.

As seen best in fig. 8, the box 39 has a window 41 in form of e.g. an opening allowing continuous inspection of how the compressed air is successively displacing the latex into the tire 3 from an at least partly transparent container 6 located in the box and having a clearly drawn plunger 30. The box 39 furthermore has a manometer 42 connected to the second air conduit 16 for indicating the current air pressure and a breaker 43 for starting the compressor 4 and stopping this compressor when the wanted air pressure has been reached.

The compressor 4 is driven by an electric motor (not shown) connected to a power source e.g. a cigarette lighter in a car at use.

The manometer 42 is advantageously arranged at the window 41 so that the manometer easily can be read during operation. The manometer is also used if e.g. a tire 2 having gone flat is to be inflated. When the wanted pressure has been reached, the compressor 4 is disconnected by the switch 43.

The cylinder 18 is furthermore arranged with a knob 44 serving for pushing the cylinder 7 forward to a position corresponding to the position of the cover 22 in figs. 2 - 5 and the second position described in detail in the previous description by turning the knob in the direction indicated by the arrow in the figure.

To prevent the knob from being turned unintentionally and bring the cylinder 18 and the cover 22 into said second operative position, a safety ring 45 is provided between the knob 44 and the box 39, said ring having to be removed manually in the direction indicated by the arrow in the figure before it will be possible to turn the knob 44.

As seen best in fig. 9, the box 39 has a section, for example a chamber 40 or an opening, for receiving and keeping the first conduit 10 with associate adapter 13 when the device is not used.

The first conduit 10 is advantageously made of a material, the flexibility/rigidity ratio of which will cause the conduit 10, due to the properties of the material, to arrange itself along the inside edge 40 of the hollow. Alternatively, the chamber 40 can be provided with a detachable covering or a door.

After use, for example when a tire has been sealed and inflated, the box must be prepared for renewed use.

For this purpose, the first conduit 10, the needle 23, the adapter 13 and the container 6 are replaced as mentioned under the description of fig. 6. The lid 46 designed on the box axially opposite the knob 44 is removed to thereby make room for squeezing the locking tabs 24 of the needle 22 in direction towards each other so that the needle can be detached.

By means of the knob 44, the cover 22 is brought back to its first operative position whereby the cylinder 18 is detached and the first conduit 10, the needle 23, the adapter 13 and the container 6 jointly can be pulled out and discarded.

In the lid 46, a groove or slot can possibly be designed so that the lid easily can be freed by means of e.g. a coin. Removal of the lid 46 can therefore be done without use of special tools.

Fig. 11 is a fractional view of the device according to the invention with a first embodiment of a seal in form of a membrane 48 for closing the outlet opening 9 of the container 6 in the case shown. The membrane 48 is cast of e.g. plastic in one piece with the edge 49 of the aperture 9. Thereby, an advantageous, inexpensive structure is obtained, the membrane then being formed simultaneously with the casting of the container.

If a punctured tire is to be mended and subsequently inflated to a wanted pressure, the membrane is broken by the needle 23 in the way described above (not shown).

It is to be noted that also the aperture 33 of the plunger 30 can be provided with a similar membrane (not shown).

Figs. 11 and 12 are fractional views of the device according to the invention with a second embodiment of a seal in form of slabs 50 and 51.

In fig. 11, the slabs are detachably mounted in the outlet openings, 9 and 33 respectively, of the container 6 and the plunger 34 by means of collars, 52 and 53 respectively, pressed into the associate outlet openings with a suitable force fit.

In fig. 12, the slabs have been pushed out of their respective openings by means of the needle 23, which has a blunt end for this purpose.

If slabs are used as seals, the outlet openings, 9 and 33 respectively, of the container and the plunger can be opened without risk of parts of a membrane being driven into and completely or partly closing the needle and/or the subsequent connections to the cover. The force fit can advantageously be adapted in such a way that the slabs are held tightly sealed in their openings but relatively easily and for certain can be pushed out of these openings.

The device according to the invention is quick and easy to operate. Sealing and inflating of a punctured tire can be done in less than three minutes and often as fast as only one minute. When the device is packed up in the box, it practically takes up no space in e.g. a car. To this should be added that the device makes the heavy and bulky spare wheel, which the driver conventionally is driving around with, unnecessary. By instead using the device according to the invention, the space and load capacity previously occupied by the spare wheel is now utilised.

The device according to the invention is described above and shown in the drawing on the assumption that it was to be used for inflating a car tire having gone flat or for sealing and inflating a car tire having punctured.

Naturally, this is only to be taken as an example as the device just as well can be used for performing the same operations on other tires or other inflatable objects within the scope of the invention.

#### Patent claims

- A device (1) for inflating a tire (2) having gone flat, 1. to a wanted pressure and for sealing and inflating a punctured tire (3) and of the kind that comprises a compressed-air source (4); a tubular container (6) filled with a sealing agent (7) and having an inlet opening (8) for passage of compressed air from the compressed-air source (4) and an outlet opening (9) for passage of sealing agent (7) and compressed air; a first conduit (10) connected to a first area on the device (1) at a first end (11) and having an adapter (13) for detachably connecting the first conduit (10) to a valve (14) on the tire (2;3) at the second end (12); and a second conduit (16) connected to a second area on the device at a first end (15) and to the compressed-air source (4) at the second end (17), characterised in that the device (1) furthermore comprises that the container (6) is enclosed by a tubular cylinder (18) connected to the first end (15) of the second conduit and having a fixed bottom (19) in one end and an aperture (20) in the other end, said aperture being closed by a cover (22) connected to the first end (11) of the first conduit and mounted on the cylinder (18) displaceable between a first operative position in which the first conduit (10) is communicating with the interior of the cylinder (18) and a second operative position in which the first conduit (10) is communicating with the outlet opening (9) of the container.
- 2. A device (1) according to claim 1, characterised in that the outlet opening (9) of the container is sealed by a first seal (28); that a plunger (30) is located in the container (6) behind the sealing agent (7), said plunger being displaceable from a bottom position (31) at the inlet opening (8) to a top position (32) at the outlet

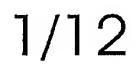
opening (9); that an aperture (33) is made in the plunger (30) and is sealed by a second seal (34); and that the cover (22) is provided with a needle (23) connected to the first end (11) of the first conduit and located at a distance from the first seal (28) in the first operative position of the cover (22) and penetrating this seal if the cover (22) is displaced from its first to its second operative position, and through the second seal (34) if the plunger (30) upon activation of the compressed-air source (4) is pushed from its bottom (31) to its top position (32) by the generated compressed air.

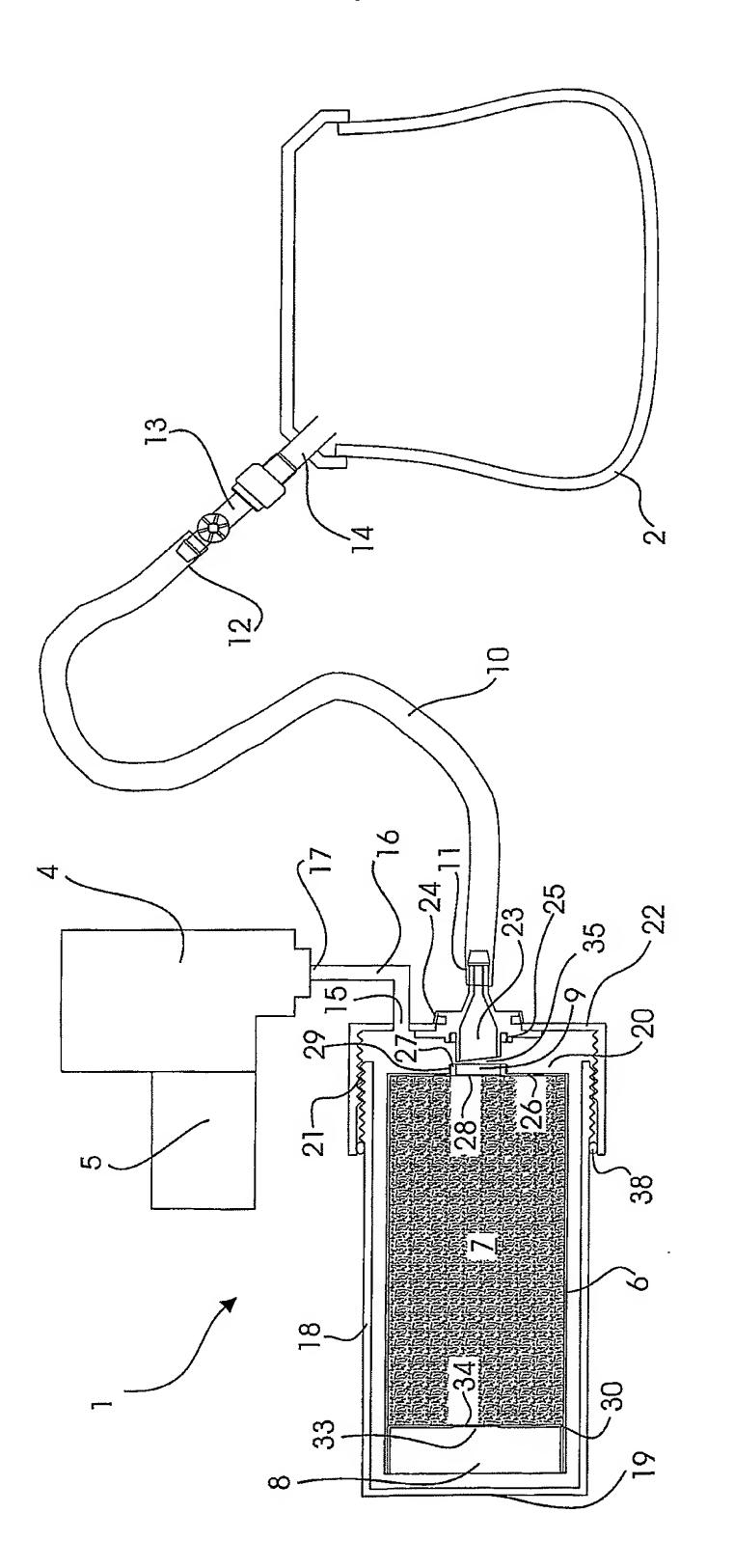
- 3. A device according to claim 1 or 2, characterised in that the cylinder (18) and the cover (22) are connected to a threaded joint (21).
- 4. A device according to claim 1, 2 or 3, characterised in that the outlet opening (9) of the container is located in a branch piece (27) on a bottom (26) made on the container.
- 5. A device according to claim 4, characterised in that the branch piece (27) and the needle (23) respectively are made with corresponding barbs (25;29) engaging each other when the device (1) is in its second operative position.
- 6. A device according to any of the claims 2 5, characterised in that the needle (23) is detachably mounted in an aperture (36) made in the cover (22) with a sufficiently large size to allow the first conduit (10) and its adapter (13) to pass, and that a gasket (37) is located between the needle (23) and the aperture in the cover.
- 7. A device according to any of the claims 1 6, characterised in that the first end (15) of the second

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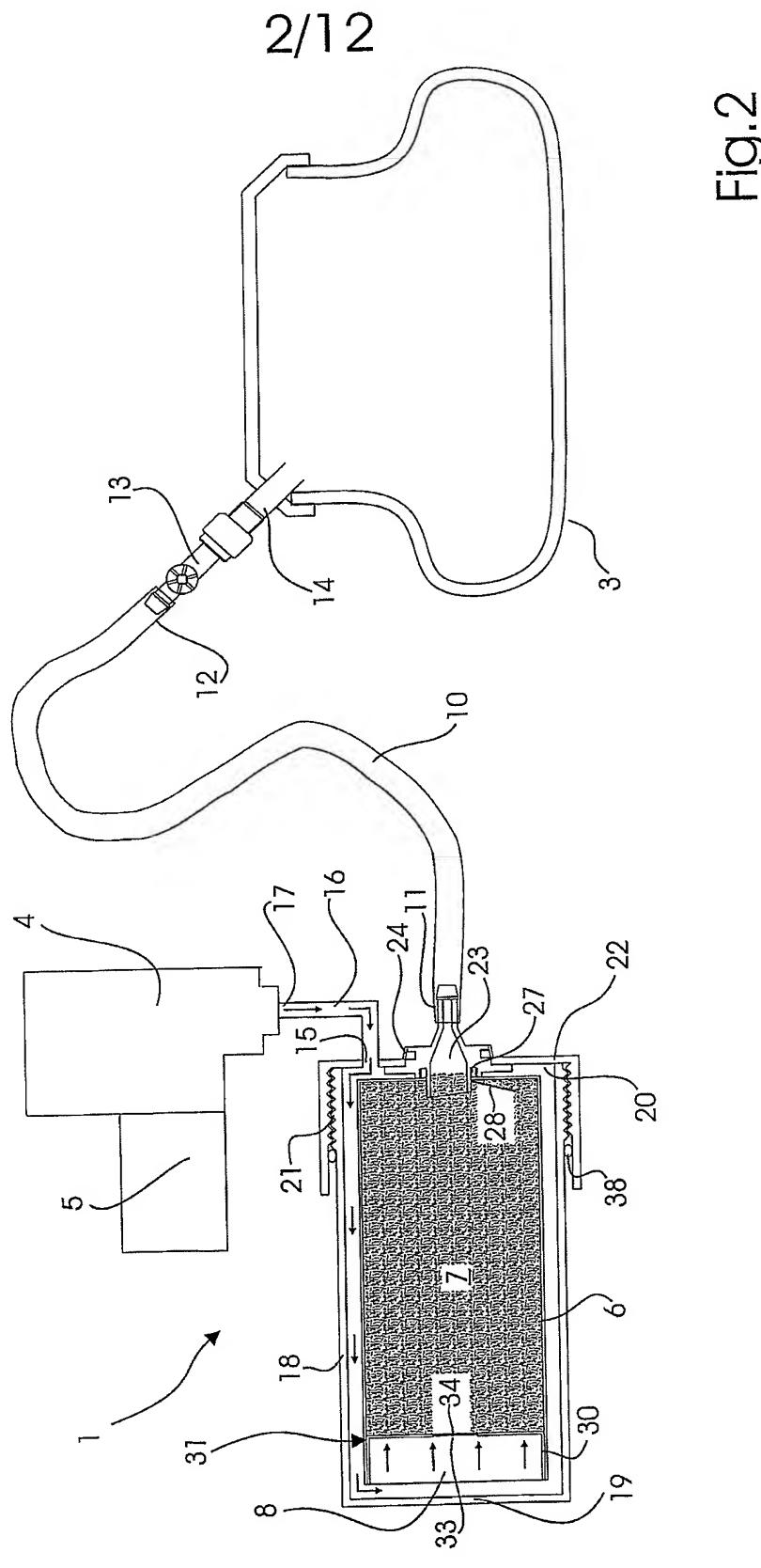
conduit is connected to the cover (22) and that a gap (35) is located between the container (6) and the cylinder (18), which will allow the second conduit (16) to communicate with the inlet opening (8) of the container.

- 8. A device according to any of the claims 1 7, characterised in that the cylinder (18) and the container (6) are made of a transparent material whereas the plunger (30) and/or the sealing agent (7) have a distinct, dark colour.
- 9. A device according to any of the claims 1 8, characterised in that the cylinder (18) and the container (6) are located in a box (39) having at least one window (41) allowing visual viewing of the cylinder (18) and manual displacement of the cylinder (18).
- 10. A device according to any of the claims 1 9, characterised in that the container (6) consists of a conduit, the inlet opening (8) of which is formed by an open end on the conduit while the inlet opening (8) is located at a distance from the bottom (19) of the cylinder.
- 11. A device according to claims 2 10, characterised in that the first and/or second seals are breakable membranes made in one piece with the edge of the respective opening.
- 12. A device according to claims 2 10, characterised in that the first and/or second seals are made as slabs detachably mounted in the respective opening.



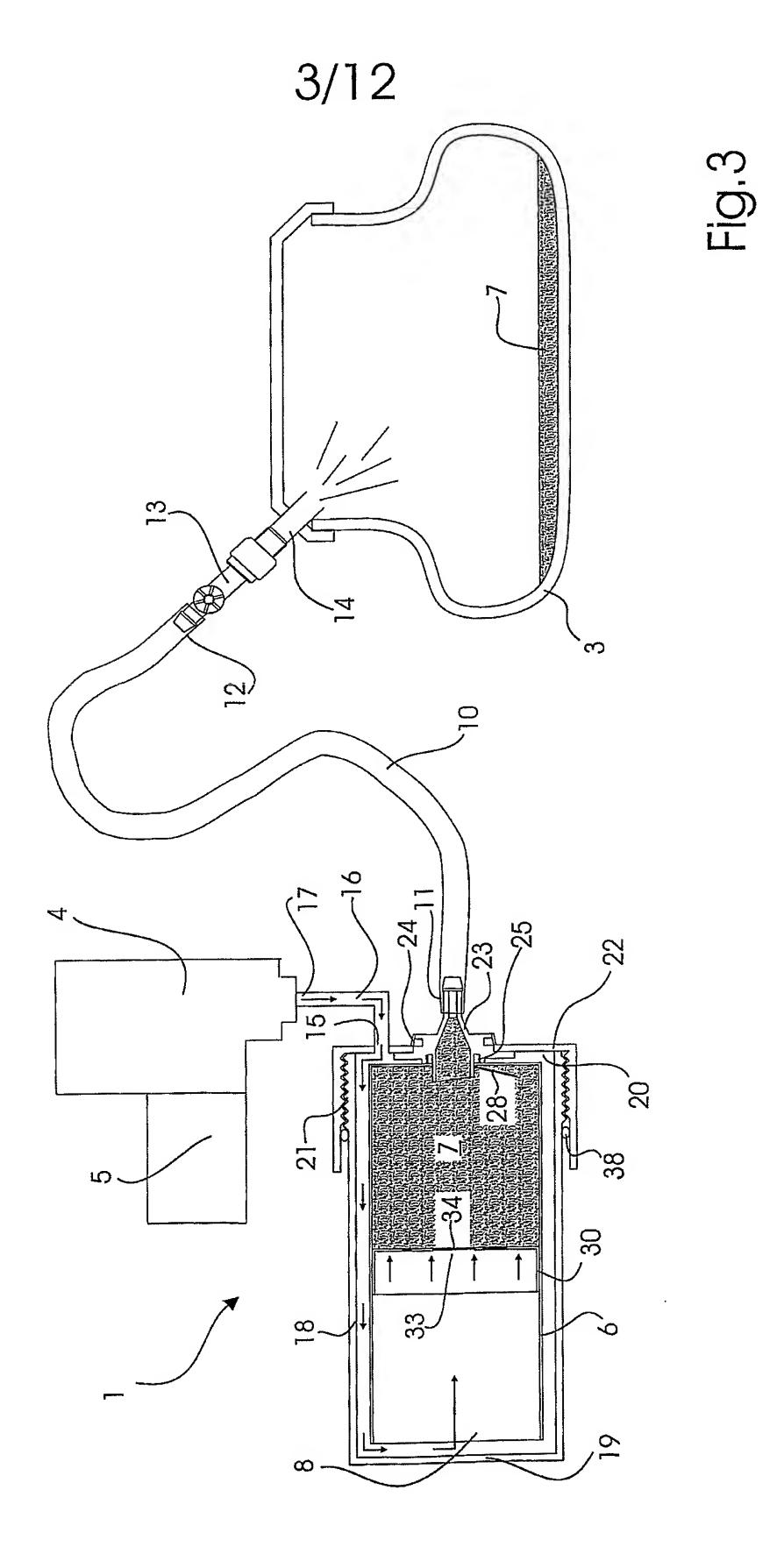


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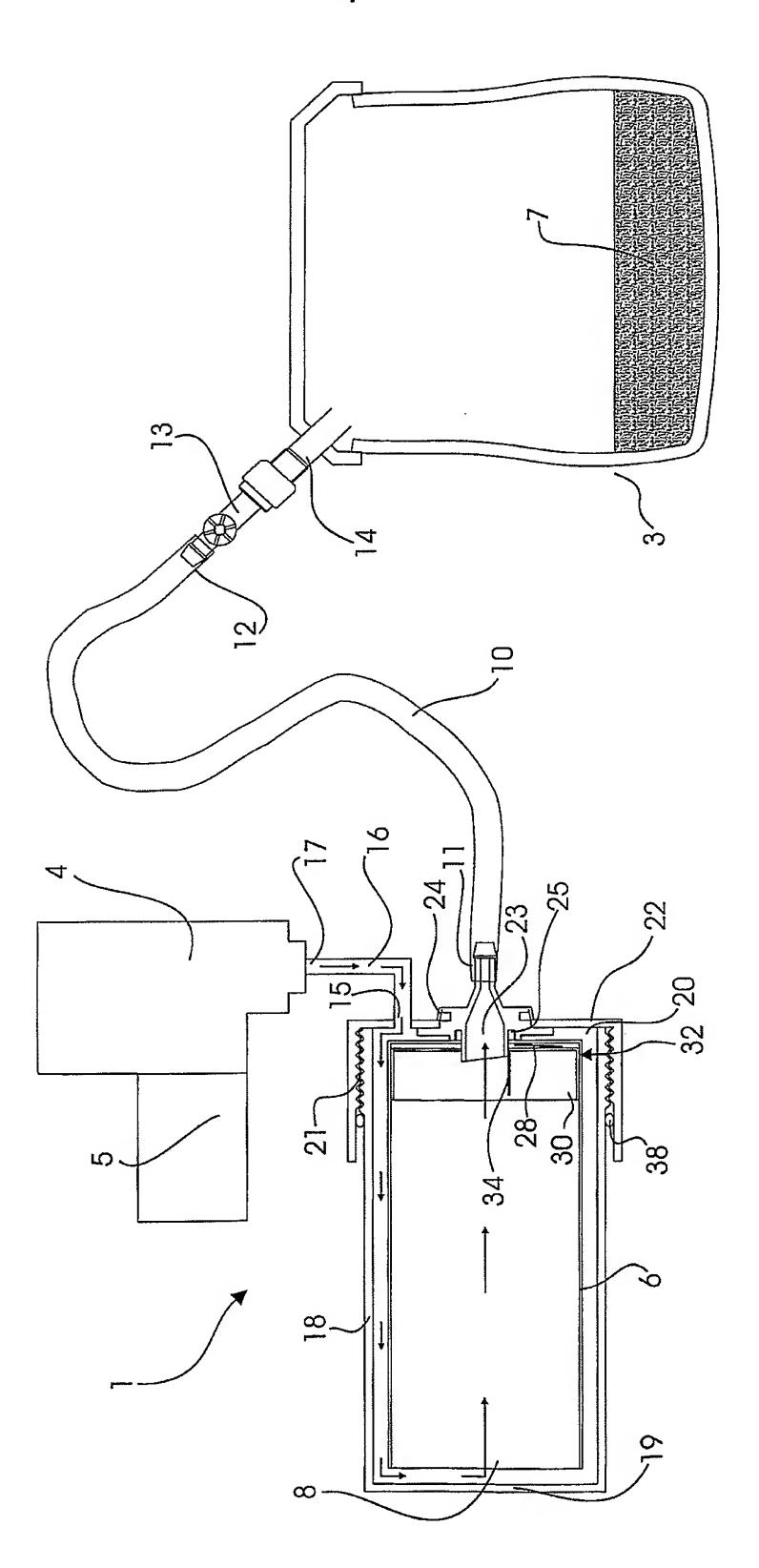
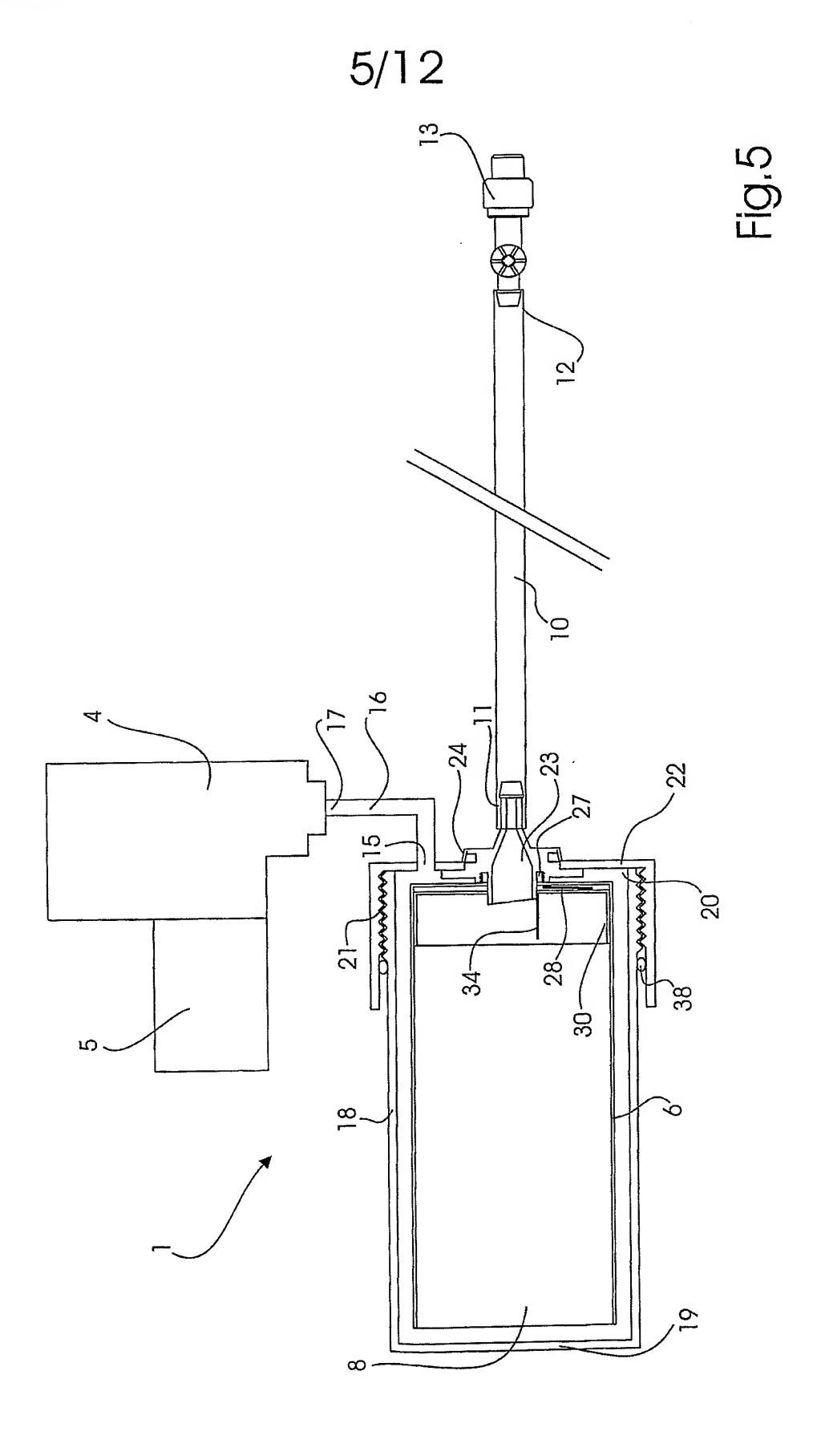
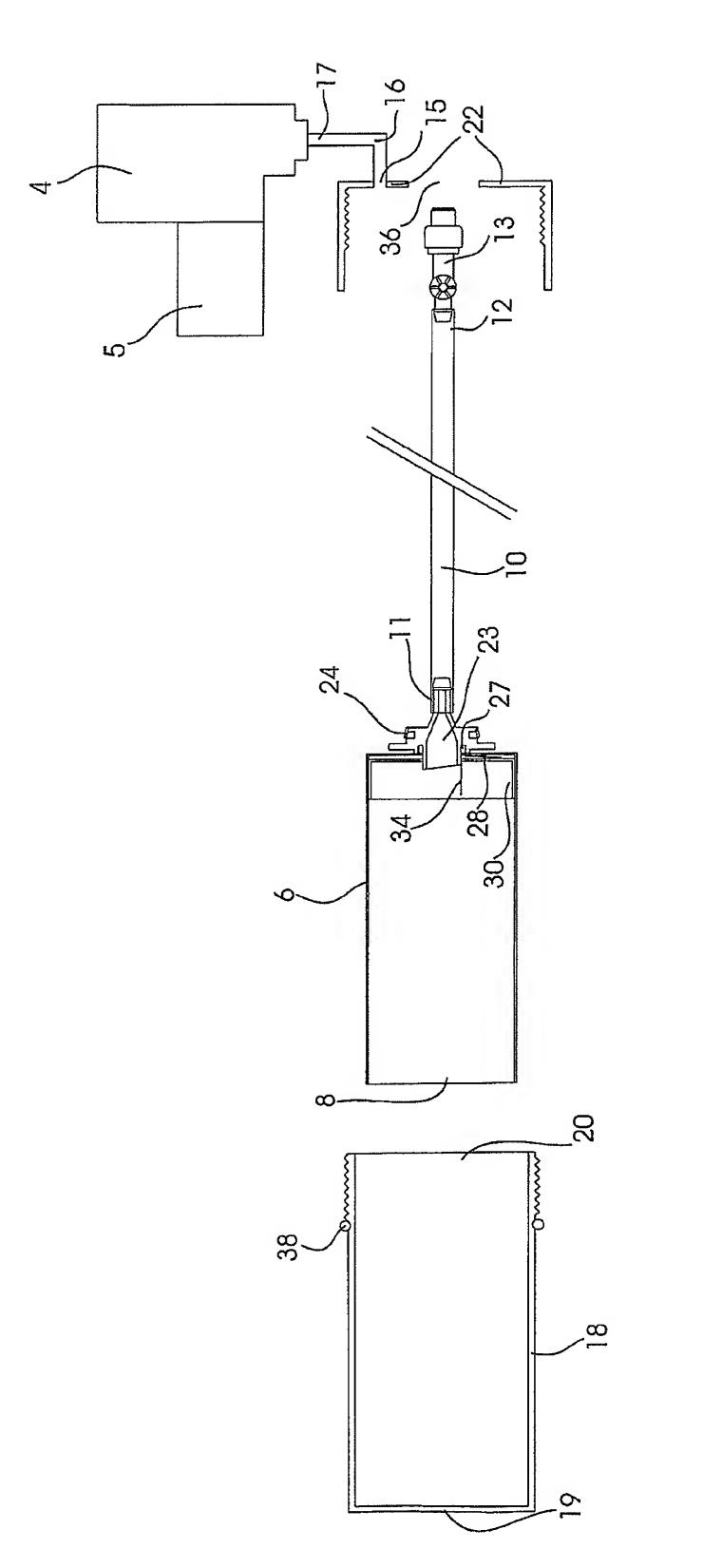


Fig.4



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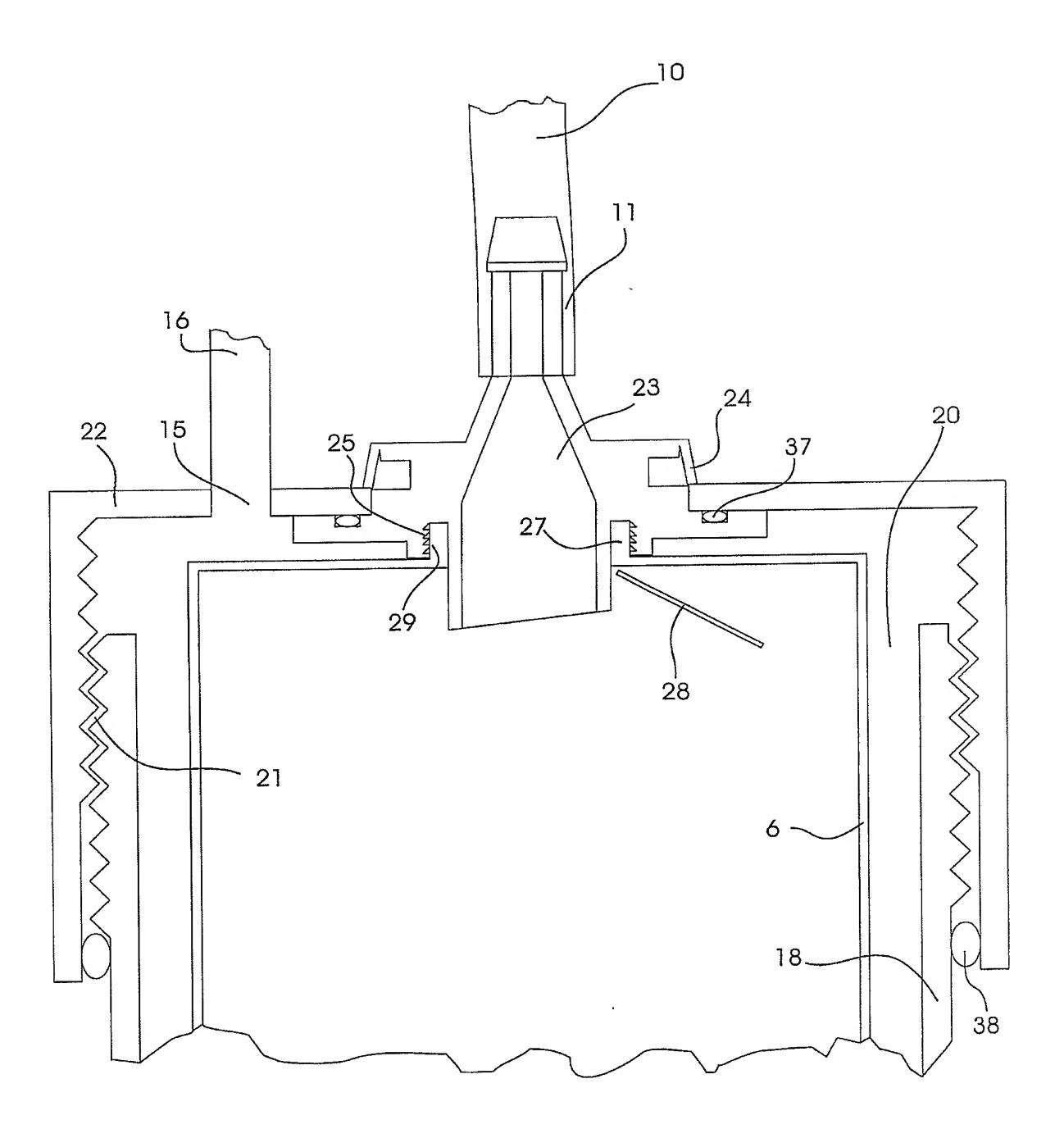
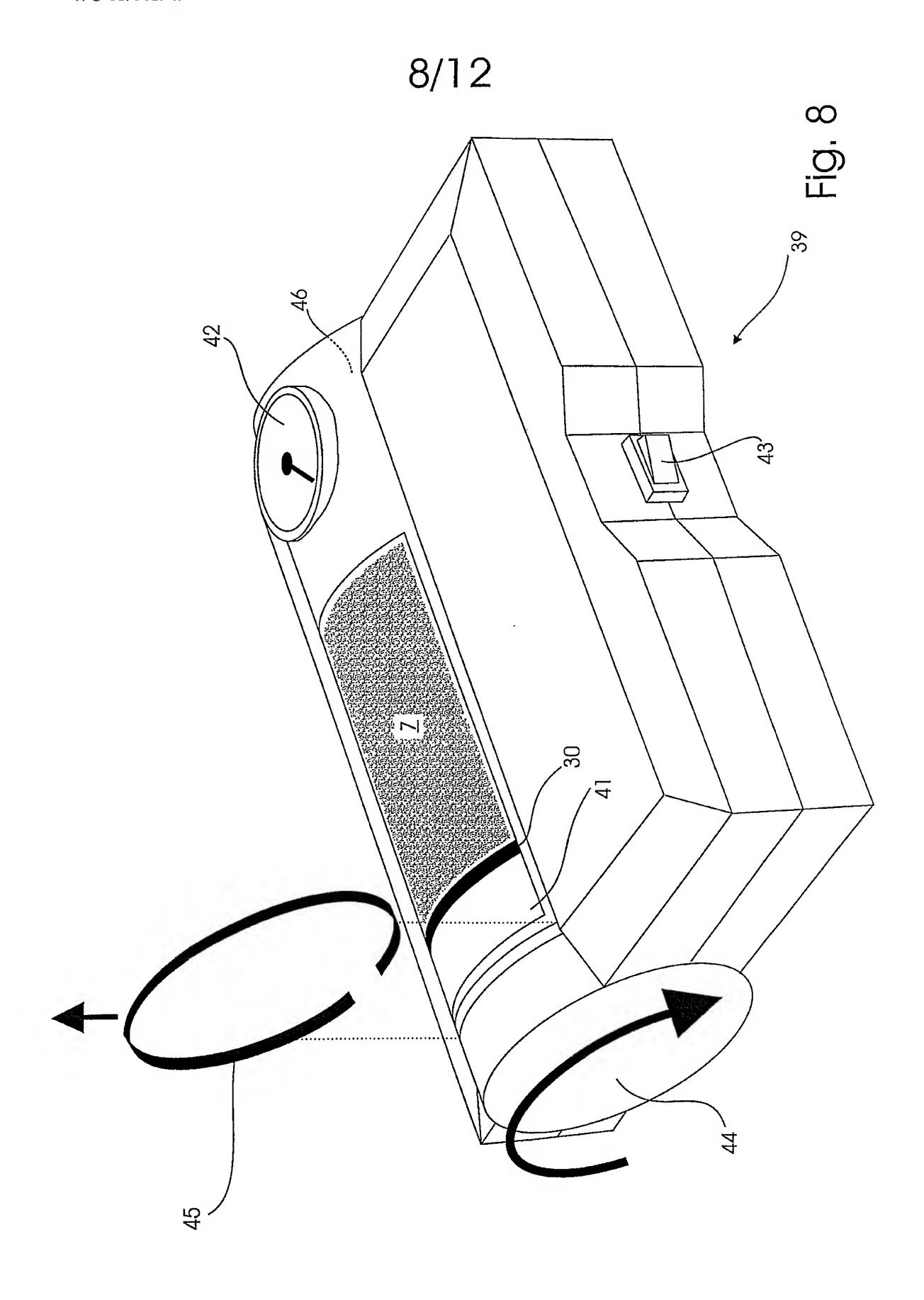
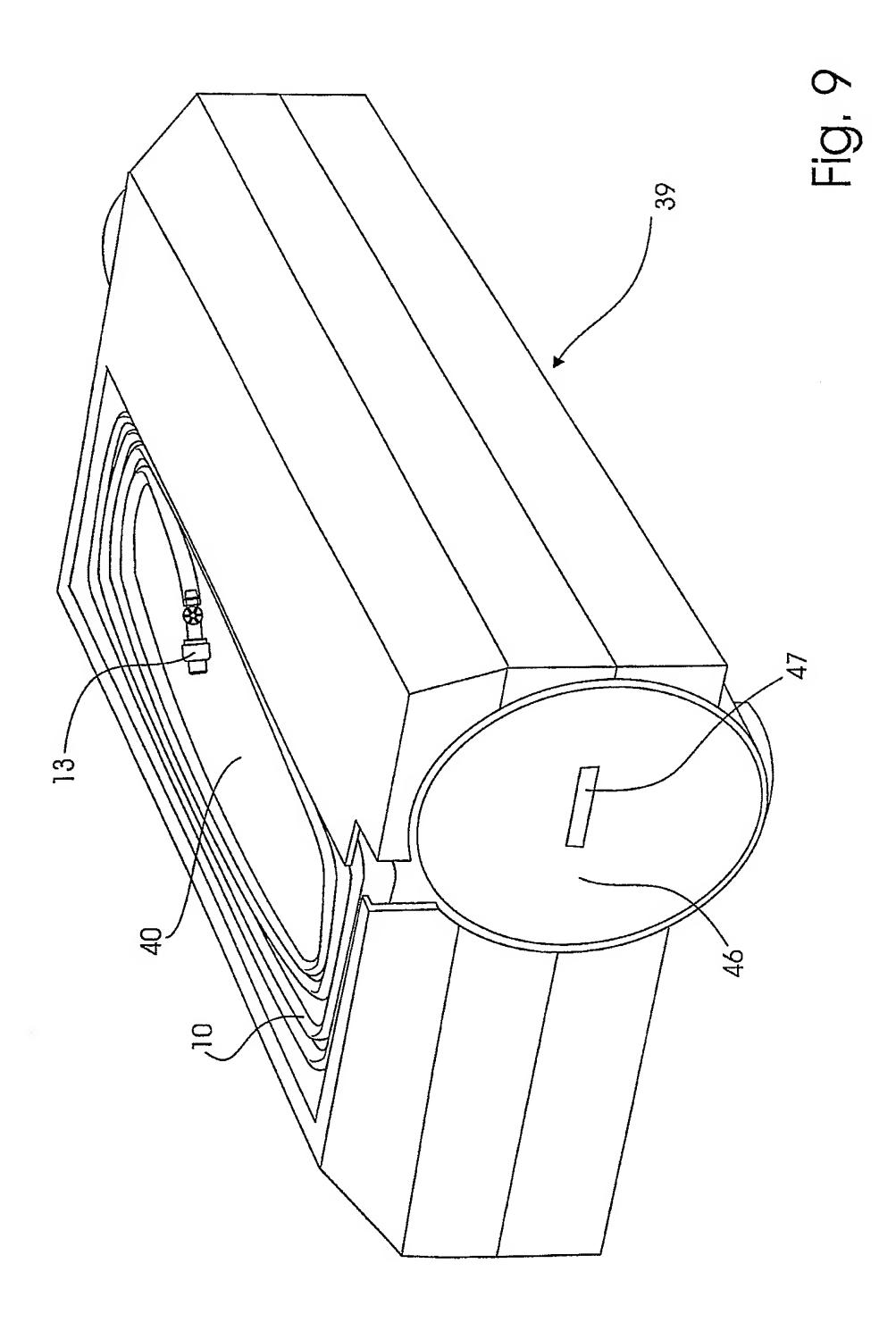


Fig. 7

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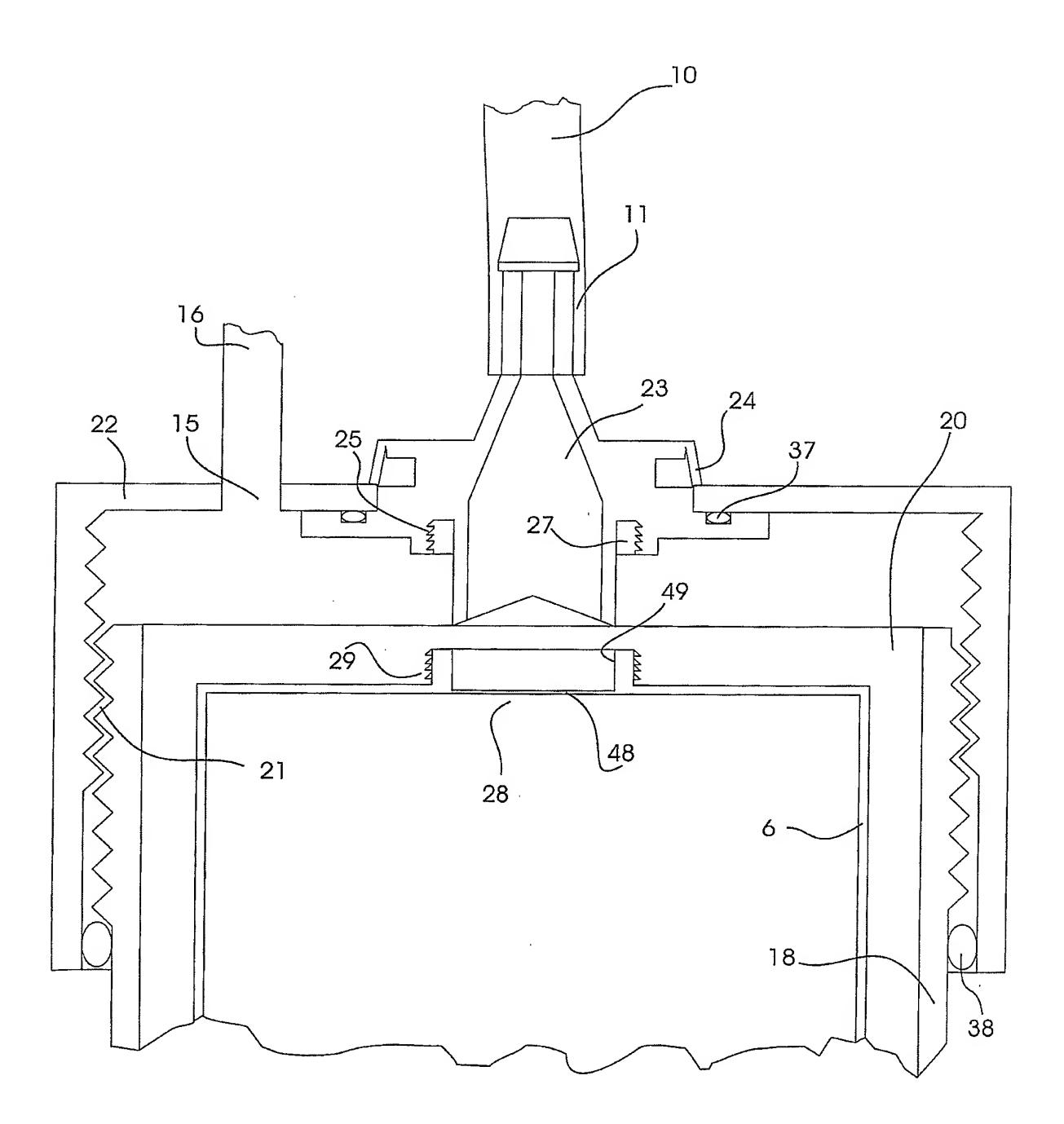


Fig. 10

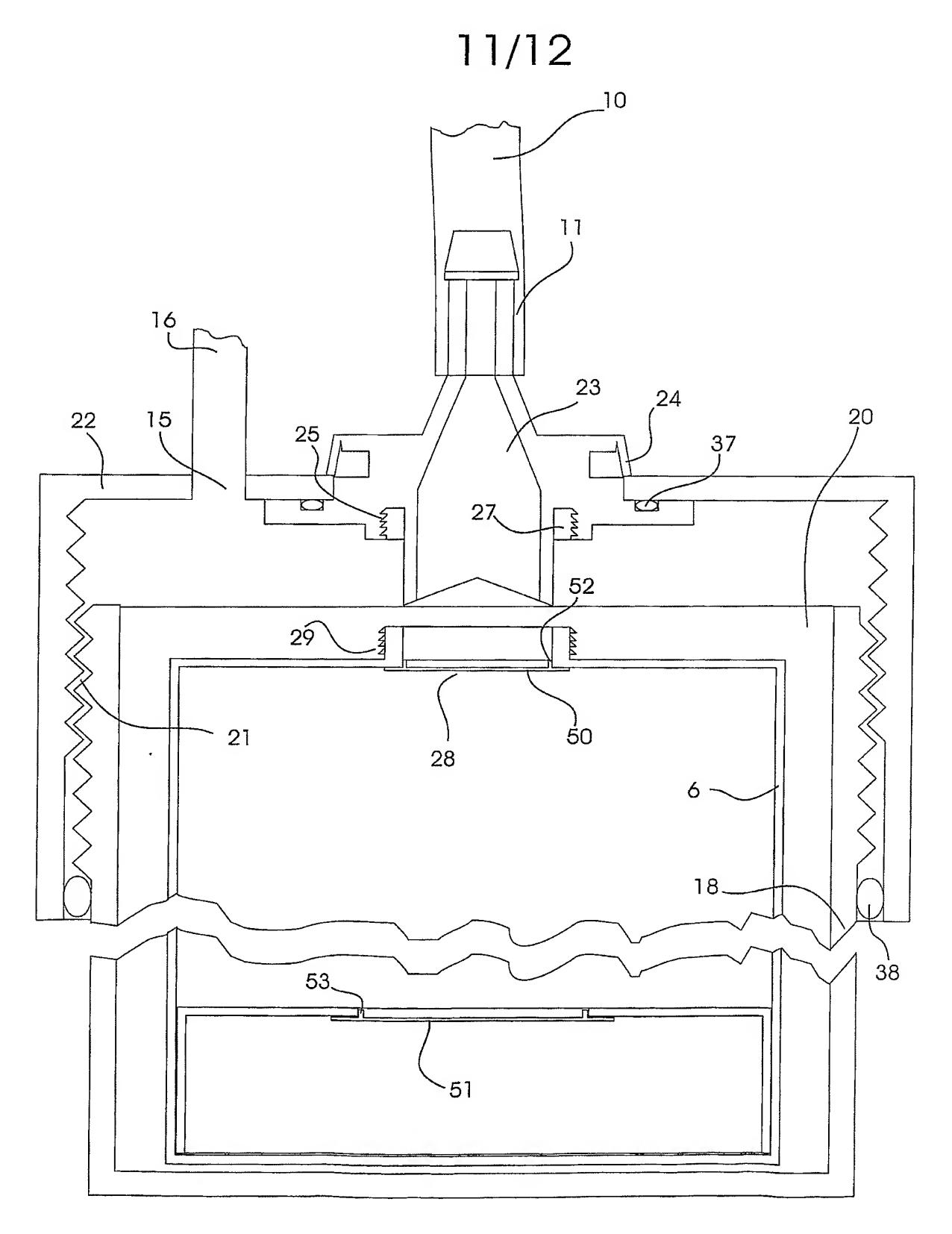


Fig. 11

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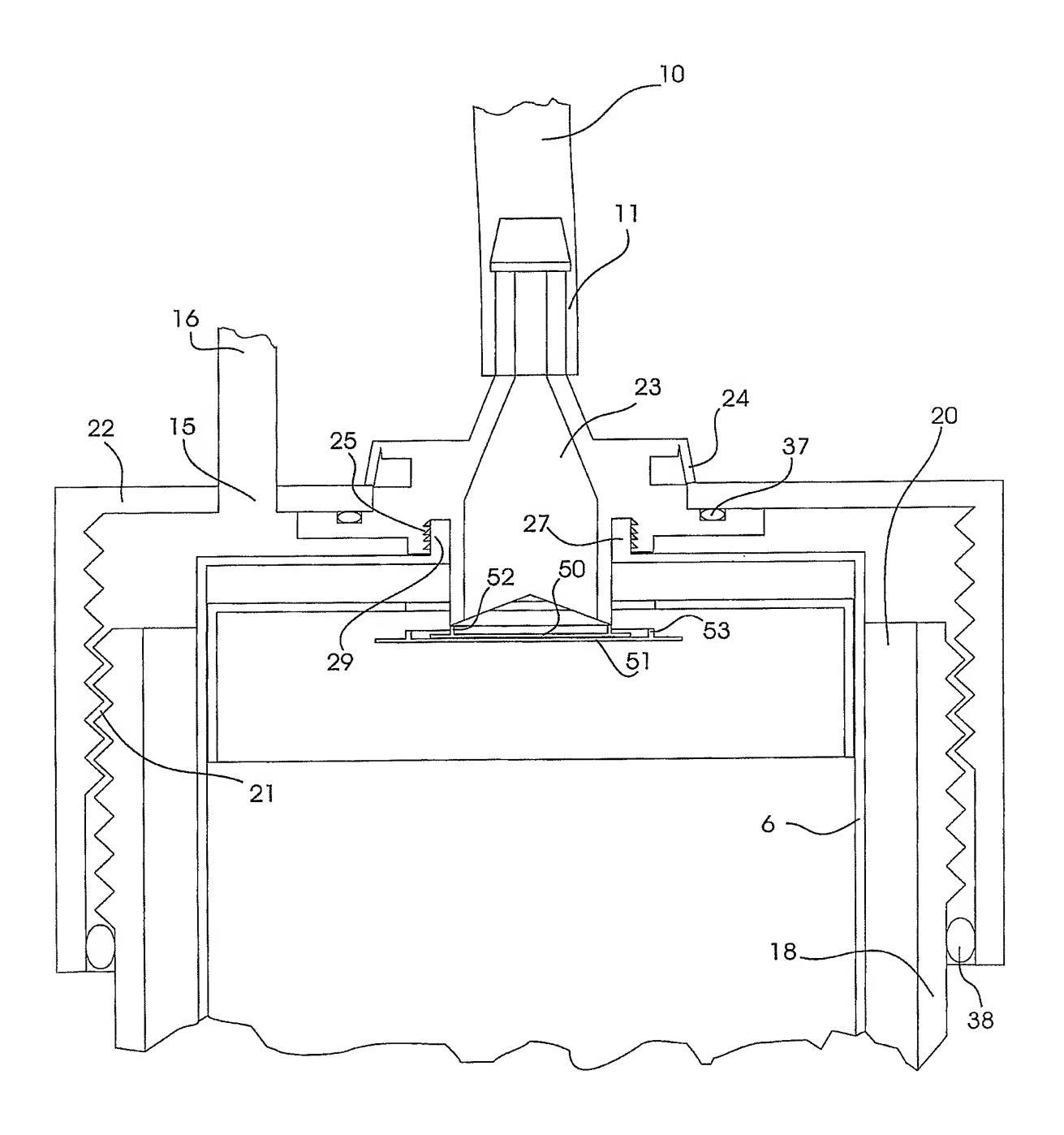


Fig. 12

### INTERNATIONAL SEARCH REPORT

International application No.

### PCT/DK 02/00763 A. CLASSIFICATION OF SUBJECT MATTER IPC7: B29C 73/02 According to International Patent Classification (IPC) or to both national classification and IPC B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC7: B29C, B60C, B29D Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched SE,DK,FI,NO classes as above Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-INTERNAL, WPI DATA C. DOCUMENTS CONSIDERED TO BE RELEVANT Relevant to claim No. Citation of document, with indication, where appropriate, of the relevant passages Category\* 1-12 US 6176285 B1 (GERRESHEIM ET AL), 23 January 2001 A (23.01.01), figure 1, claims 1-2, abstract 1-12 DE 10015166 A1 (DUNLOP GMBH), 4 October 2001 Α (04.10.01), figure 1, claims 1-13, abstract 1-12 DE 29913545 U1 (SCHÜLLER, DIETER), A 10 February 2000 (10.02.00), page 1 - page 3, figure 2, abstract See patent family annex. Further documents are listed in the continuation of Box C. later document published after the international filing date or priority Special categories of cited documents: date and not in conflict with the application but cited to understand document defining the general state of the art which is not considered the principle or theory underlying the invention to be of particular relevance document of particular relevance: the claimed invention cannot be earlier application or patent but published on or after the international considered novel or cannot be considered to involve an inventive filing date step when the document is taken alone document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other document of particular relevance: the claimed invention cannot be special reason (as specified) considered to involve an inventive step when the document is combined with one or more other such documents, such combination document referring to an oral disclosure, use, exhibition or other being obvious to a person skilled in the art document published prior to the international filing date but later than document member of the same patent family the priority date claimed Date of mailing of the international search report Date of the actual completion of the international search 2 9 -0 1- 2003 27 January 2003 Name and mailing address of the ISA/ Authorized officer Swedish Patent Office Fredrik Andersson/MP Box 5055, S-102 42 STOCKHOLM +46 8 782 25 00 Telephone No.

Facsimile No. +46 8 666 02 86

### INTERNATIONAL SEARCH REPORT

International application No. PCT/DK 02/00763

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A	WPI Derwent's abstract, abstract no. 2001-575155, week 0165, ABSTRACT OF JP 2001212883 (SUMITOMO RUBBER IND.), 7 August 2001 (07.08.01), fig. 1,2, abstract	1-12.
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International application No. PCT/DK 02/00763

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# (9) BUNDESREPUBLIK DEUTSCHLAND



DEUTSCHES
PATENT- UND
MARKENAMT

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71) Anmelder:

Stehle, Michael, 88662 Überlingen, DE

(74) Vertreter:

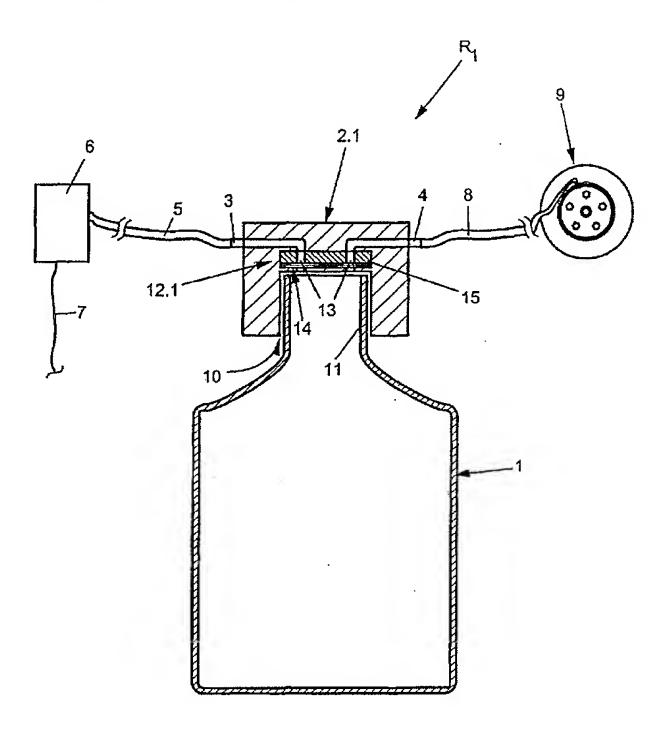
Dr. Weiss, Weiss & Brecht, 78234 Engen

② Erfinder:

gleich Anmelder

### Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

- (54) Vorrichtung zum Ausbringen von Reifendichtmittel
- Bei einer Vorrichtung zum Ausbringen von Reifendichtmittel aus einem Behälter (1), welchem ein Entnahmeelement (2.1 bis 2.3) zum Ausbringen von Reifendichtmittel zugeordnet ist, soll das Entnahmeelement (2.1 bis 2.3) zumindest ein Ventil aufweisen.





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#### Beschreibung

[0001] Die vorliegende Erfindung betrifft eine Vorrichtung zum Ausbringen von Reifendichtmittel aus einem Behälter, welchem ein Entnahmeelement zum Ausbringen von Reifendichtmittel zugeordnet ist.

[0002] Derartige Vorrichtungen sind in vielfältiger Form und Ausführung auf dem Markt bekannt und gebräuchlich. Es wird auf die DE 199 48 706.5 verwiesen, die eine ähnliche entsprechende Vorrichtung beschreibt.

[0003] Ferner sind Vorrichtungen zum Ausbringen von Reifendichtmittel im Markt bekannt, die sehr grosse aufwendige apparative Elemente enthalten, um beispielsweise einen Behälter mit Reifendichtmittel aufzunehmen und zu entleeren. Nachteilig bei derartigen Vorrichtungen ist, dass 15 sie sehr viel Raum, beispielsweise in einem Kofferraum eines Autos einnehmen und ein sehr hohes Gewicht aufweisen, was unerwünscht ist. Diese sind zudem teuer in der Herstellung und insbesondere aufwendig zu warten, was insbesondere das Austauschen der Behälter mit Reifendicht- 20 mittel betrifft. Zudem sind diese umständlich zu bedienen, da beispielsweise sämtlich Verbindungsleitungen zum Kompressor zur Entnahmevorrichtung aufwendig angeschlossen werden müssen. Ferner muss dann beispielsweise der Behälter mit Reifendichtmittel geöffnet werden und mit 25 der Entnahmevorrichtung verbunden werden.

[0004] Der vorliegenden Erfindung liegt die Aufgabe zugrunde, eine Vorrichtung der eingangs genannten Art zu schaffen, welche die genannten Nachteile beseitigt, mit welcher eine sehr kostengünstige komfortable Bedienung möglich ist. Zudem soll die Vorrichtung kostengünstig herzustellen, leicht zu bedienen und bei geringstem Einbauraum in jedem beliebigem Fahrzeug unterbringbar sein.

[0005] Zur Lösung dieser Aufgabe führt, dass das Entnahmeelement zumindest ein Ventil aufweist.

[0006] Bei der vorliegenden Erfindung ist dem Entnahmeelement wenigstens ein Ventil zugeordnet, welches unterschiedliche Positionen schaltet. Die eine Position ist ein vollständiges Verschliessen von Einlass und Auslass zum Behälter.

[0007] In einer zweiten Position werden Verbindungskanäle und Kanäle zum Behälterinneren zum Ausbringen von Reifendichtmittel freigeschaltet. Ein weitere Position ermöglicht ein reines Durchschalten von Einlass zum Auslass, ohne dass Luft durch den Behälter strömt. In der durchgeschalteten Position, die mittels eines Bypasses realisiert wird, kann Luft beispielsweise direkt zum Aufpumpen eines Reifens geleitet werden. Dieses dient auch zum Reinigen des Verbindungsschlauches.

[0008] Es hat sich ferner als vorteilhaft erwiesen, beispielsweise die Luftquelle, insbesondere den Kompressor direkt oder nahe am Entnahmeelement vorzusehen, so dass dieser zusammen mit Entnahmeelement und wiederlösbar daran festgelegten Behälter beispielsweise in einem Gehäuse platzsparend untergebracht werden kann. Als Ventil können beispielsweise manuelle Drehventile, Schieberventile, Kugelventile od. dgl. verwendet werden. Hier sei der Erfindung keine Grenze gesetzt. Auch sei daran gedacht, die Ventil automatisch, magnetisch, elektromechanisch zu betätigen.

[0009] Damit ein Öffnen des Behälters zum Entnehmen von Reifendichtmittel entfällt, kann beispielsweise mit hohem Druck über den Einlass bzw. über den Auslass eine Folie des Behälters, insbesondere eine Siegelfolie geöffnet bzw. freigegeben werden. Hierdurch braucht dann lediglich 65 das Ventil auf Öffnen geschaltet zu werden, um die Luft über die Luftquelle, die Zuführleitung durch den Einlass in den Behälter einzuleiten. Das Reifendichtmittel strömt aus

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dem Behälter über den Verbindungskanal und Auslass über die Verbindungsleitung in den Reifen. Nach dem Ausbringen des Reifendichtmittels kann dann beispielsweise ein weiteres Aufpumpen des Reifens gewährleistet werden, in-

dem das Ventil geschlossen wird und der Bypass den Einlass mit dem Auslass verbindet. Gleichzeitig wird gewährleistet, dass kein Reifendichtmittel mehr austreten kann. Zusätzlich wird in der Verbindungsleitung verbleibendes Reifendichtmittel ausgeblasen.

10 [0010] Durch entsprechende Schaltelemente, Schalthebel, Drehschalter od. dgl., die an dem Ventil angreifen, kann von aussen, wenn die Vorrichtung in ein Gehäuse eingesetzt ist, diese sehr einfach bedient werden. Lediglich muss das Schaltelement umgelegt werden, um beispielsweise das Rei15 fendichtmittel in den Reifen einzupumpen.

[0011] Insgesamt ist mit der vorliegenden Erfindung eine Vorrichtung zum Ausbringen von Reifendichtmittel aus einem Behälter geschaffen, mit welcher auf sehr einfache, schnelle, effektive und kostengünstige Weise ohne grosse Anschlussarbeiten entweder nur Luft oder Reifendichtmittel in einen Reifen eingebracht werden kann.

[0012] Zudem soll daran gedacht sein, dass die Vorrichtung, insbesondere das Gehäuse beispielsweise fester Bestandteil eines Fahrzeuges oder fest integrierter Bestandteil eines Fahrzeuges sein kann und lediglich eine Verbindungsleitung, ein Schlauch od. dgl. aus dem Fahrzeug, beispielsweise aus dem Kofferraum herausgezogen wird, um die Reifen mit Luft zu befüllen oder mittels Reifendichtmittel zu reparieren.

[0013] Weitere Vorteile, Merkmale und Einzelheiten der Erfindung ergeben sich aus der nachfolgenden Beschreibung bevorzugter Ausführungsbeispiele sowie anhand der Zeichnung; diese zeigt in

[0014] Fig. 1 einen schematisch dargestellten Längsschnitt durch eine Vorrichtung zum Ausbringen von Reifendichtmittel aus einem Behälter mit einem Entnahmeelement;

[0015] Fig. 2a einen Längsschnitt durch ein weiteres Ausführungsbeispiel des Entnahmeelementes gemäss Fig. 1;

40 [0016] Fig. 2b einen Querschnitt durch das Entnahmeelement gemäss Fig. 2a entlang Linie II-II;

[0017] Fig. 2c eine Draufsicht auf ein Deckelelement des Entnahmeelementes gemäss Fig. 2a;

[0018] Fig. 2d eine Draufsicht auf das Ventil, insbesondere eine Drehscheibe des Ventils des Entnahmeelementes gemäss Fig. 2a;

[0019] Fig. 3 einen schematisch dargestellten Längsschnitt durch ein weiteres Ausführungsbeispiel der Vorrichtung gemäss Fig. 1;

[0020] Fig. 4 einen vergrössert dargestellten Teillängsschnitt durch das Entnahmeelement gemäss Fig. 3;

[0021] Fig. 5 eine schematisch dargestellte Seitenansicht auf einen Behälter mit integrierter Vorrichtung zum Ausbringen von Reifendichtmittel;

[0022] Fig. 6 eine schematisch dargestellte Draufsicht auf ein weiteres Ausführungsbeispiel des Behälters gemäss Fig. 5;

[0023] Fig. 7 eine schematisch dargestellte Draufsicht auf eine weitere Vorrichtung zum Ausbringen von Reifendichtmittel in einer anderen Gebrauchslage.

[0024] Gemäss Fig. 1 weist eine erfindungsgemässe Vorrichtung R<sub>1</sub> zum Ausbringen von Reifendichtmittel aus einem Behälter 1 ein Entnahmeelement 2.1 auf, welches mit einem Einlass 3 und einem Auslass 4 versehen ist. An den Einlass 3 lässt sich ggf. über eine Zuführleitung 5 eine Luftquelle 6, insbesondere Druckluftquelle oder Kompressor anschliessen. Dabei kann auch die Zuführleitung 5 sehr kurz ausgebildet sein. Ferner soll auch im Rahmen der vorliegen-

den Erfindung liegen, die Luftquelle 6, insbesondere den Kompressor direkt mit dem Entnahmeelement 2 zu verbinden. Diese können auch aus einem Bauteil hergestellt sein, oder zumindest sehr nahe aneinander angeordnet sein.

[0025] Über eine elektrische Leitung 7 wird die Luftquelle 5 6, insbesondere der Kompressor mit Strom gespeist, beispielsweise vom Zigarettenanzünder eines Fahrzeuges.

[0026] An den Auslass 4 lässt sich eine Verbindungsleitung 8 anschliessen, die auch fest am Entnahmeelement 2.1 angeschlossen sein kann. Diese wird zu einem reparaturbe- 10 dürftigen Reifen 9 geführt.

[0027] Das Entnahmeelement 2.1 weist ferner eine Einstecköffnung 10 auf, um den Behälter 1 mit seinem Behälterhals 11 aufzunehmen, bzw. darin festzulegen. Vorzugsweise wird der Behälter 1 in die Einstecköffnung 10 einge- 15 schraubt und dort wieder lösbar festgelegt.

[0028] Der Vorteil bei der vorliegenden Erfindung ist, dass dem Entnahmeelement 2.1 ein Ventil 12.1 zugeordnet ist, welches in einer ersten Position vorzugsweise zwei Verbindungskanäle 13 freischaltet, die eine Verbindung zum Be- 20 hälter 1 herstellen.

[0029] Dabei kann dem Behälter 1, insbesondere endseits des Behälterhalses 11 ein Verschlusselement 14 zugeordnet sein, welches beispielsweise eine Heissiegelfolie od. dgl.

[0030] Auch soll daran gedacht sein, zwischen Ventil 12.1, insbesondere dessen Drehteller 15 die entsprechende Folie anzuordnen, und das zum Öffnen lediglich hoher Druck über die Zuführleitung 5 den Einlass 3 beaufschlagt, so dass die Verbindungskanäle 13 geöffnet werden. Hierzu 30 kann es erforderlich sein, den Bereich des Verschlusselementes 14, in welchem die Verbindungskanäle 13 liegen, ggf. vorher zu perforieren.

[0031] Ferner soll im Rahmen der vorliegenden Erfindung liegen, das Ventil 12.1 manuell und/oder automatisch bei- 35 spielsweise elektromagnetisch oder elektromechanisch zu betreiben.

[0032] Durch Verdrehen des Ventils 12.1, insbesondere dessen Drehteller 15 lässt sich beispielsweise eine Schliessposition einstellen. Dann sind Einlass 3 und Auslass 4 ge- 40 schlossen. In einer weiteren Position, wie sie beispielsweise aus den Fig. 2a und 2d hervorgeht, in welchen ein weiteres Entnahmeelement 2.2 gezeigt ist, lässt sich durch Verdrehen des Drehtellers 15, insbesondere des Ventil 12.2 ein Bypass 16 derart schalten, so dass Einlass 3 mit Auslass 4 über das 45 Ventil 12.2 verbunden werden.

[0033] Die Verbindungskanäle 13 liegen dann nicht auf den Kanälen 17 des Entnahmeelementes 2.2 auf.

[0034] Damit das Ventil 12.2 beispielsweise manuell betätigt werden kann, ist dem Grundgehäuse 18, wie es insbe- 50 sondere in Fig. 2b dargestellt ist, wenigstens ein Ausschnitt 19 gebildet, durch welchen beispielsweise ein Schaltelement 20, siehe Fig. 2d, geführt werden kann. Das Schaltelement 20 kann beispielsweise als Schalthebel, Schaltstange od. dgl. ausgebildet sein. Auch kann hier ein Drehschalter 55 od. dgl. anschliessen. Dies soll ebenfalls im Rahmen der vorliegenden Erfindung liegen.

[0035] In Fig. 2c ist als Draufsicht ein Deckel 21 aufgezeigt, bei welchem Einlass 3 und Auslass 4 oben angeordnet sind. Wie es jedoch auch aus Fig. 1 ersichtlich ist, können 60 auch Einlass 3 und Auslass 4 seitlich im Deckel 21 vorgesehen sein. Hierauf sei die Erfindung nicht beschränkt.

[0036] In dem Ausführungsbeispiel der vorliegenden Erfindung gemäss Fig. 3 ist eine Vorrichtung R2 aufgezeigt, bei welcher ein Entnahmeelement 2.3 dem Behälter 1 in 65 10 Einstecköffnung oben beschriebener Weise aufgesetzt wird. Anstelle des drehbaren Ventils 12.1 sitzt im Ventil 12.3 bzw. im Entnahmeelement 2.3 ein Schieberventil. In der dargestellten Lage

des Ventils 12.3 sind die Kanäle 13 geöffnet. Diese können jedoch durch Verschieben eine Verbindung von Einlass 3 bzw. Auslass 4 zum Behälter 1 schliessen oder in der Stellung des Bypasses 16 eine Verbindung zwischen Einlass 3 und Auslass 4 herstellen. Dies ist dann von Bedeutung, wenn beispielsweise lediglich nur Luft aus der Luftquelle 6 über die Zuführleitung 5, durch das Entnahmeelement 2.3 über die Verbindungsleitung 6 zum Reifen 9 geführt werden muss, um diesen beispielsweise aufzupumpen.

[0037] Auf diese Weise lässt sich beispielsweise der Behälter 1 zumindest teilweise mit Reifendichtmittel entleeren und anschliessend kann durch Umschalten des Ventils 12.1 bis 12.3 in die jeweilige Bypass-Stellung der Reifen aufgepumpt werden, wobei der Behälter 1 verschlossen bleibt.

[0038] Dieser Bypass gewährleistet ferner auch, dass das Entnahmeelement 2.3, insbesondere die Verbindungsleitung 8 beispielsweise nach einem Ausbringen von Reifendichtmittel gesäubert bzw. ausgeblasen werden kann. Es muss dann lediglich der Behälter 1 ausgetauscht werden.

[0039] In Fig. 4 ist das Entnahmeelement 2.3 vergrössert dargestellt, wobei in dieser dargestellten Gebrauchslage der Bypass 16 den Einlass 3 mit Auslass 4 verbindet. Der zumindest eine Kanal 17 ist in dieser Lage geschlossen. Dabei kann mittels des Schaltelementes 20 das Ventil 12.3 in oben beschriebener Weise betätigt werden.

[0040] Gemäss Fig. 5 sind Behälter 1 mit Entnahmeelement 2.2 sowie Luftquelle 6 bzw. Kompressor in einem Gehäuse 22 integriert und lediglich Schaltelement 20 sowie Verbindungsleitung 8 und ggf. die elektrische Leitung 7 ragen aus dem Gehäuse 22 heraus.

[0041] Durch einfaches Betätigen des Schaltelementes 20 lässt sich je nach Stellung des Ventils 12.1 bis 12.3 entweder Luft oder Reifendichtmittel ausbringen.

[0042] Dabei kann das Gehäuse 22 in jeder beliebigen Position angeordnet werden, wobei auch daran gedacht sein kann, wie es in Fig. 6 dargestellt ist, einen Drehschalter als Schaltelement 20 zu verwenden. Somit kann beispielsweise stirnseitig, seitlich, deckel- oder bodenseitig das Schaltelement angeordnet werden, um in jeder beliebigen eingebauten Lage des Gehäuses 22, beispielsweise im Kofferraum eines PKWs, eine Bedienung zu gewährleisten. Beispielsweise kann auch der Behälter 1 liegend, wie es in Fig. 6 dargestellt ist, im Gehäuse 22 angeordnet sein, wobei beispielsweise ein Steigrohr 23 dann das Ausbringen von Reifendichtmittel unterstützen kann. Auf diese Weise ist der Behälter 1 unabhängig von seiner Lage.

[0043] In Fig. 7 ist dargestellt, wie der Behälter 1 beispielsweise auf den Kopf gestellt ist, so dass auch ein vollständiges Ausbringen von Reifendichtmittel über das Entnahmeelement 2.1 gewährleistet wird, ohne dass beispielsweise das Steigrohr 23 erforderlich wäre. Ebenfalls ist ein Austauschen des Behälters 1 leicht möglich.

#### Positionszahlenliste

- 1 Behälter
- 2 Entnahmeelement
- 3 Einlass
- 4 Auslass
- 5 Zuführleitung
- 6 Luftquelle
- 7 Leitung
- 8 Verbindungsleitung
- 9 Reifen
- 11 Behälterhals
- 12 Ventil
- 13 Verbindungskanal

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10

- 14 Verschlusselement
- 15 Drehteller
- 16 Bypass
- 17 Kanal
- 18 Grundgehäuse
- 19 Ausschnitt
- 20 Schaltelement
- 21 Deckel
- 22 Gehäuse
- 23 Steigrohr

#### Patentansprüche

- 1. Vorrichtung zum Ausbringen von Reifendichtmittel aus einem Behälter (1), welchem ein Entnahmeelement 15 (2.1 bis 2.3) zum Ausbringen von Reifendichtmittel zugeordnet ist, dadurch gekennzeichnet, dass das Entnahmeelement (2.1 bis 2.3) zumindest ein Ventil (12.1 bis 12.3) aufweist.
- 2. Vorrichtung nach Anspruch 1, dadurch gekenn- 20 zeichnet, dass das Ventil (12.1 bis 12.3) als Ein- oder Mehrwegeventil ausgebildet ist.
- 3. Vorrichtung nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass das Ventil (12.1 bis 12.3) einen Einlass (3) und einen Auslass (4) aufweist, wobei an den Einlass (3) eine Luftquelle (6), insbesondere eine Luftdruckquelle und an den Auslass (4) eine Verbindungsleitung (8) zum Verbinden mit einem Reifen (9) anschliessbar ist.
- 4. Vorrichtung nach Anspruch 3, dadurch gekennzeichnet, dass in einer ersten Einstellung des Ventils (12.1 bis 12.3) über zumindest einen Bypass (16) Einlass (3) und Auslass (4) miteinander verbindbar sind.

  5. Vorrichtung nach Anspruch 4, dadurch gekennzeichnet, dass der Behälter (1) in der ersten Position 35 des Ventils (12.1 bis 12.3) bei hergestellter Verbindung zwischen Einlass (3) und Auslass (4) verschlossen, ins-
- besondere luftdicht abgeschlossen ist.

  6. Vorrichtung nach wenigstens einem der Ansprüche
  1 bis 3, dadurch gekennzeichnet, dass in einer zweiten
  40
  Position des Ventils (12.1 bis 12.3) eine Verbindung
  zwischen Einlass (3) und Behälter (1) sowie Behälter
- (1) und Auslass (4) hergestellt ist.

  7. Vorrichtung nach Anspruch 6, dadurch gekennzeichnet, dass im Anschluss an den Auslass (4), insbesondere im Anschluss an das Entnahmeelement (2.1 bis 2.3) und/oder an den Behälter (1) eine Öffnung (10) oder ein Steigrohr (23) zum Entnehmen von Reifendichtmittel vorgesehen ist.
- 8. Vorrichtung nach wenigstens einem der Ansprüche 50 1 bis 7, dadurch gekennzeichnet, dass das Ventil (12.1 bis 12.3) als Drehventil, Schiebeventil, Kugelventil manuell und/oder automatisch schaltbar ausgebildet ist.
- 9. Vorrichtung nach wenigstens einem der Ansprüche 55 3 bis 8, dadurch gekennzeichnet, dass das Ventil (12.1 bis 12.3), insbesondere der Einlass (3) unmittelbar mit der Luftquelle (6), insbesondere einem Kompressor, in Verbindung steht und eine Zuführleitung (5) zwischen Luftquelle (6) und Ventil (12), insbesondere Einlass 60 (3), kurz ausgebildet ist.
- 10. Vorrichtung nach wenigstens einem der Ansprüche 4 bis 9, dadurch gekennzeichnet, dass durch kurzfristiges Verschliessen des Ventils (12.1 bis 12.3) ein Auslaufen von Reifendichtmittel aus dem Behälter (1) unterbindbar ist, wobei ein Zuführen von Luft über den Bypass (16) in den Reifen (9) ermöglicht ist.
- 11. Vorrichtung nach wenigstens einem der Ansprüche

- 1 bis 10, dadurch gekennzeichnet, dass zum luftdichten Verschliessen des Behälters (1), insbesondere der Öffnung des Behälters (1) und/oder dem zumindest einen Kanal (17) im Ventil (12.1 bis 12.3) ein Verschlusselement (14), insbesondere eine Verschlussfolie zugeordnet ist.
- 12. Vorrichtung nach wenigstens einem der Ansprüche 1 bis 10, dadurch gekennzeichnet, dass an das Ventil (12.1 bis 12.3) wenigstens ein Schaltelement (20), insbesondere Schalthebel oder Drehschalter zum Einstellen der unterschiedlichen Positionen des Ventils (12.1–12.3) vorgesehen ist.
- 13. Vorrichtung nach Anspruch 12, dadurch gekennzeichnet, dass das zumindest eine Schaltelement (20) aus einem Gehäuse (22) zum manuellen Betätigen seitlich, stirnseitig, deckel- und/oder bodenseitig herausragt.

Hierzu 4 Seite(n) Zeichnungen

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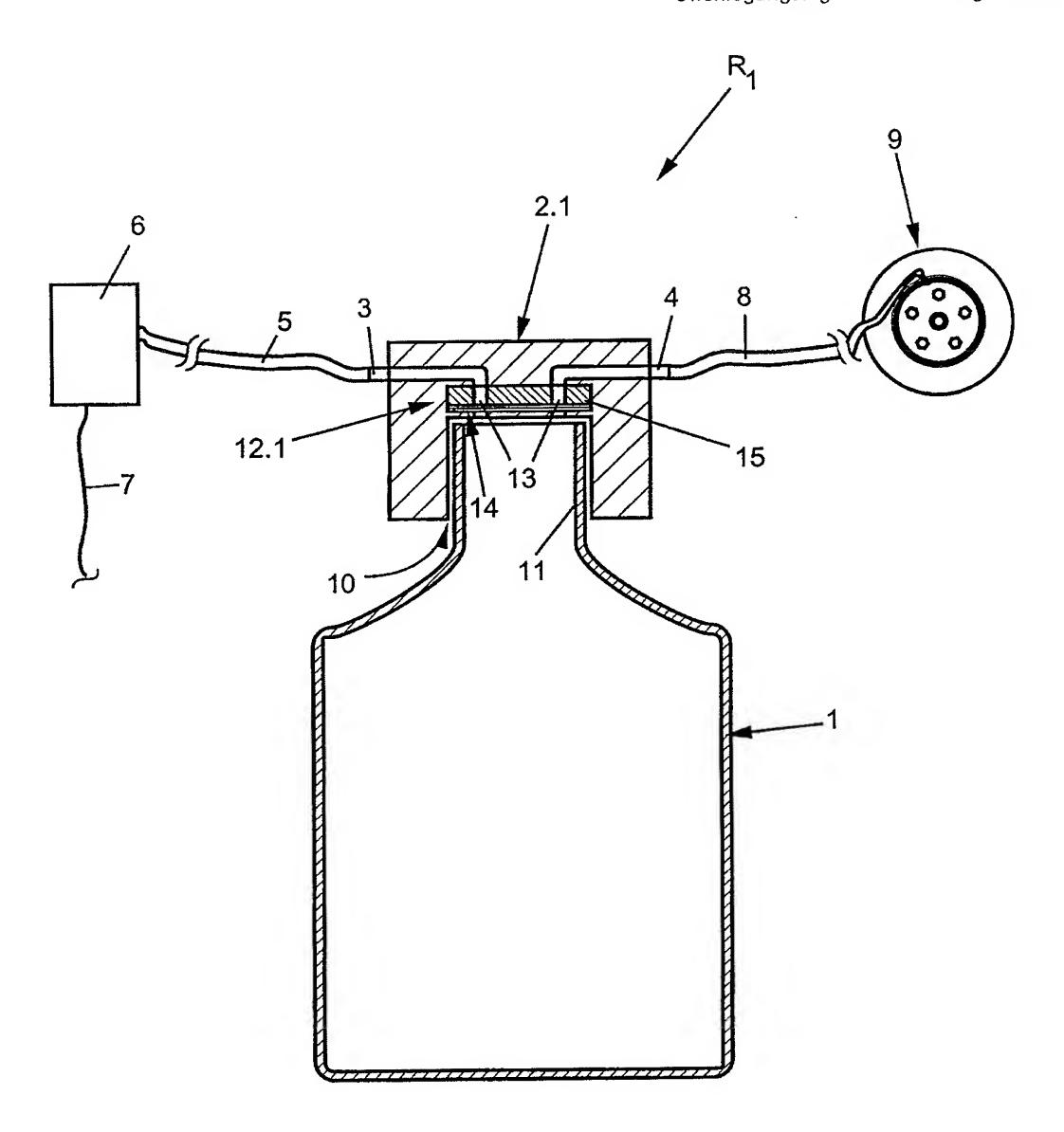
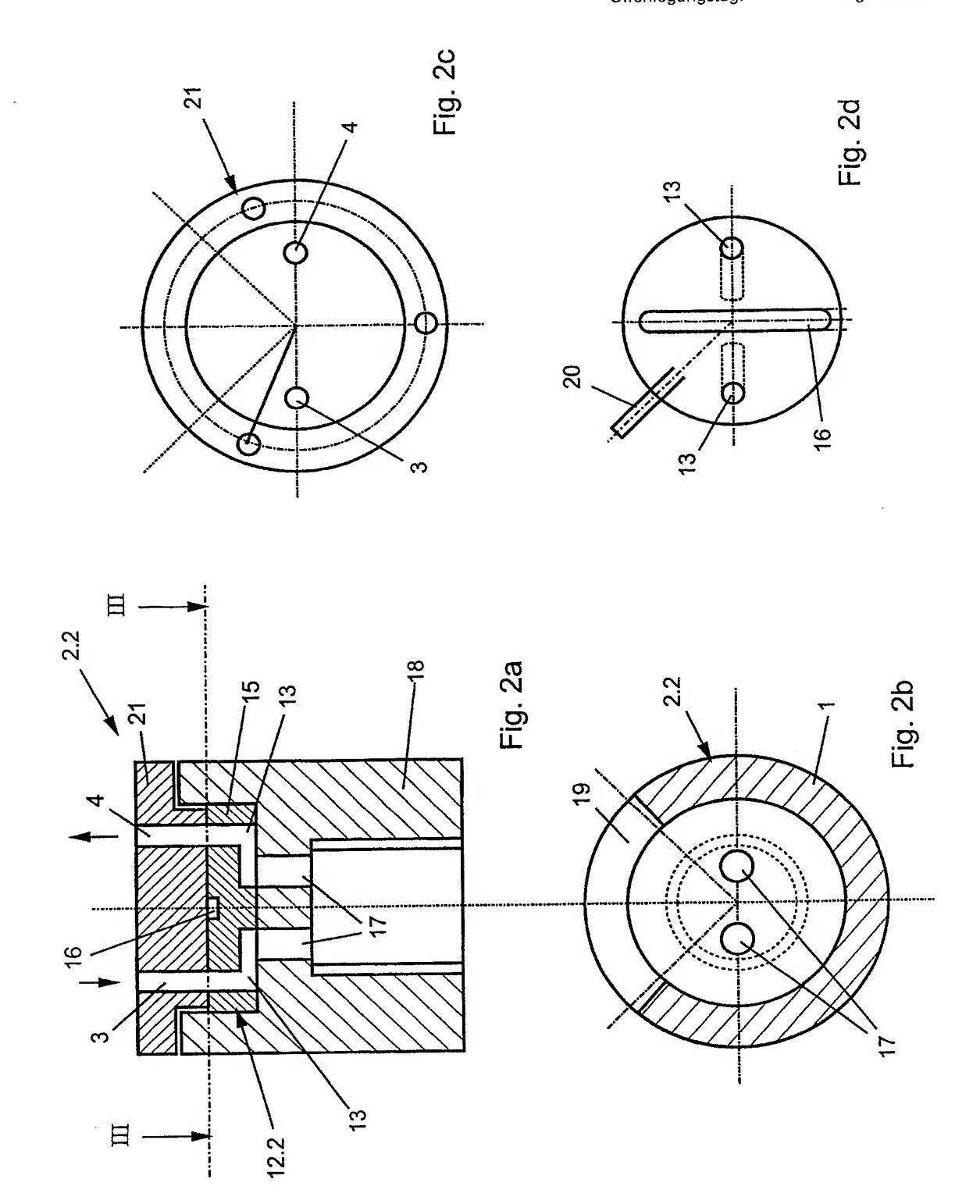
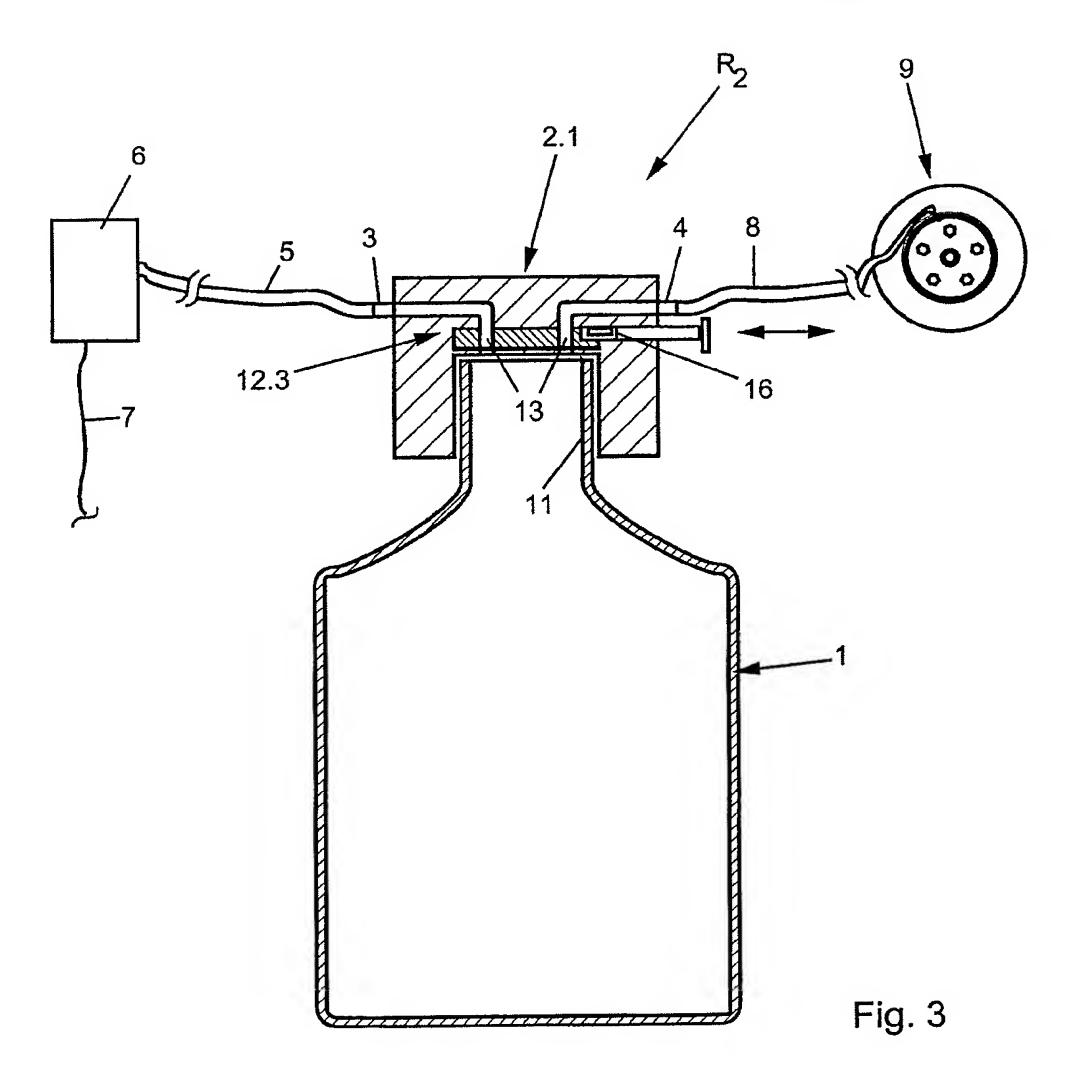


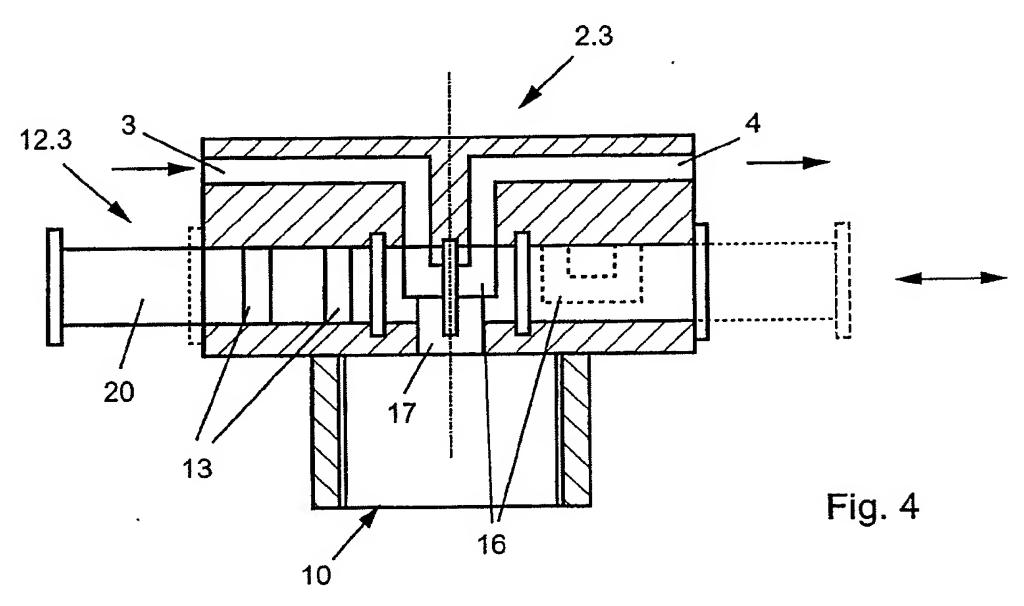
Fig. 1

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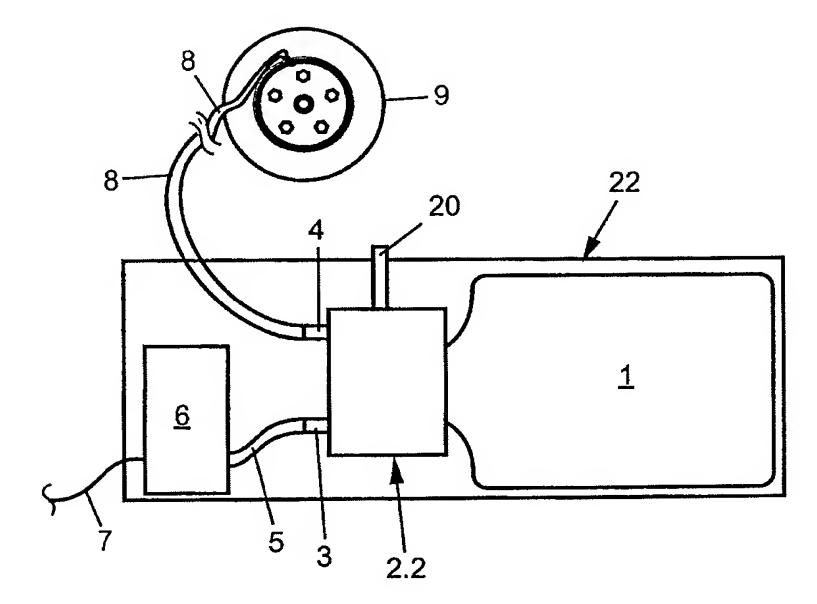


Fig. 5

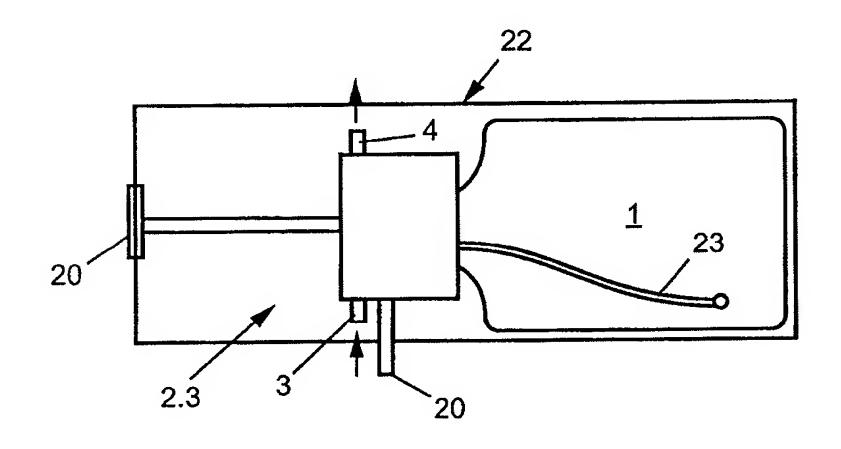


Fig. 6

